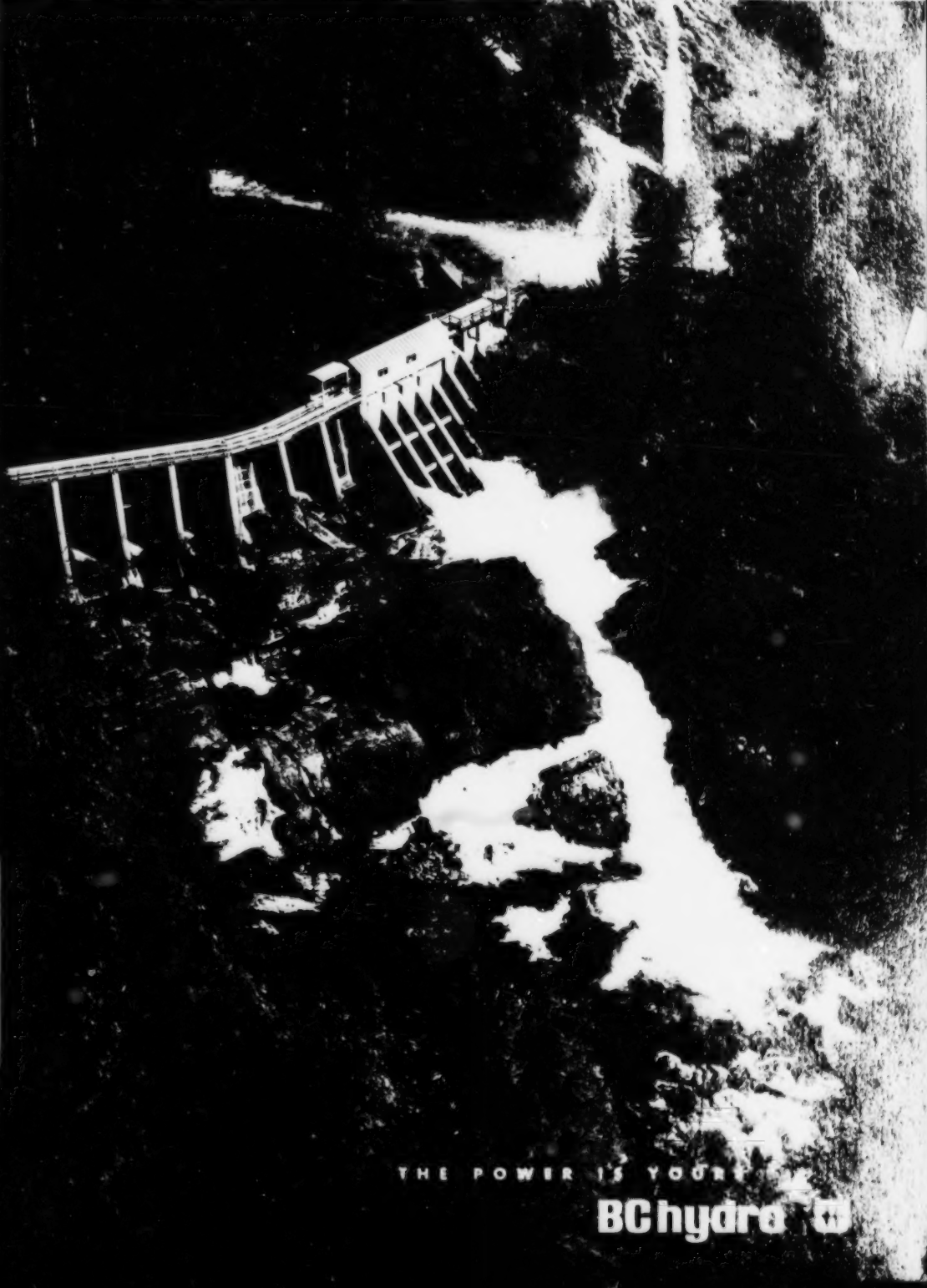


M a k i n g t h e
Connection

APRIL 2000

The BC Hydro electric
system and how it
operates.

BC
HYDRO
1-800-665-1111
2000
P 7



THE POWER IS YOURS

BC hydro 

www.bchydro.com

BC
B685
D: M2581
2000
c.3

First printing January 1994

Revised June 1995

2nd Revision April 2000

Canadian Cataloguing in Publication Data

Main entry under title:

Making the connection: the B. C. Hydro electric system
and how it is operated—2nd rev. Mar. 2000

ISBN 0-7726-4225-7

1. Electric power - British Columbia.
2. Electric power systems - British Columbia - Planning.
- I. B.C. Hydro.
- II. Title: The B.C. Hydro electric system and how it is operated.

TK3001.M34 2000

333.79'3215'09711

C00-960149-X

MAKING THE Connection

Table of Contents

THE POWER IS YOURS	1
Water Use Planning	2
THE BC HYDRO ELECTRIC SYSTEM	3
Hydroelectric Generation, Transmission and Distribution	3
THE TRANSMISSION AND DISTRIBUTION SYSTEM	4
Interconnections	4
Intraregional Transmission	5
Northern Region Transmission	5
South Interior Transmission	5
The Interior to Lower Mainland System	5
The Vancouver Island Transmission System	5
The Electric Generation System	6
Hydroelectric Generation	6
The Generation-Demand Balance	7
Thermal Generation	8
Environmental, Social and Economic Considerations	8
BC Hydro's Role in Open Access	9
Power Marketing and Electricity Trade	10
OPERATIONS PLANNING	11
Long-Term System Planning	11
Medium-Term Operations Planning	11
Marginal Cost Studies	12
System Operating Plan Studies	12
Short-Term Operations Planning	12
Inflow Forecasts	12
Short-Term Operations Studies	12
Same Day Operations	12
THE GENERATION SYSTEM	13
Peace Region	13
Columbia Region	14
Lower Mainland/Coastal/Fraser Region	16
Vancouver Island Region	17

PROJECT TECHNICAL DATA

Aberfeldie	19
Alouette	20
Ash River	21
Bridge River	22
Buntzen/Coquitlam	23
Burrard Generation Station	24
Cheakamus	25
Clowhom	26
Duncan	27
Elko	28
Falls River	29
G.M. Shrum	30
Hugh Keenleyside	31
John Hart	32
Jordan River	33
Keogh	34
Kootenay Canal	35
Ladore	36
La Joie	37
Mica	38
Peace Canyon	39
Prince Rupert	40
Puntledge	41
Revelstoke	42
Ruskin	43
Seton	44
Seven Mile	45
Shuswap	46
Spillmacheen	47
Stave Falls	48
Strathcona	49
Wahleach	50
Walter Hardman	51
Whatshan	52

GLOSSARY

53

THE POWER IS YOURS

At BC Hydro, our corporate mission is "to provide integrated energy solutions to customers in an environmentally and socially responsible manner," a mission we take very seriously. Providing electrical energy for the people of British Columbia requires careful planning and a delicate balance of the competing demands for resources and preservation of the environment.

This publication provides an overview of B.C. Hydro's integrated electric system operations to help British Columbians "***Make the Connection***" between the production of electricity and its consumption. It discusses rivers, dams, reservoirs, generating stations, transmission and distribution lines, and the myriad of considerations that come into play in managing and operating the BC Hydro electric system.

In British Columbia, we are fortunate that we are able to meet almost all of our electricity demand with our hydroelectric installations. Typically, our 29 hydroelectric generating stations provide approximately 90 per cent of the electrical energy supplied by BC Hydro. The remainder is provided from thermal facilities or purchased power. The electricity reaches customers through an interconnected, province-wide system of transmission and distribution lines, sometimes referred to as "the grid."

Hydroelectricity is a clean and renewable resource, but the benefits are not enjoyed without careful management of our collective water resource for the benefit of all British Columbians. With our growing understanding of the past, present and potential future environmental impacts of our generating facilities, we at BC Hydro have under way a comprehensive program of environmental impact management. Ongoing are programs for integrated vegetation management, bird and mammal protection, fish and wildlife compensation, and recreation area maintenance and development.

BC Hydro is also implementing an Environmental Management System (EMS) consistent with the international ISO 14001 standard. In 1999, Burrard Generating Station achieved ISO registration. In addition, Burrard installed new selective catalytic reduction (SCR) technology to reduce nitrogen oxide emissions, making it one of the cleanest, lowest-emission gas-fired plants in North America.

The Integrated Electricity Plan, released in early 2000, commits to acquiring up to 10 per cent of BC Hydro's future incremental load growth from "new green" resources. In addition, we continue to encourage more efficient generation and use of electricity through our Resource Smart and Power Smart programs respectively, and have embarked on a comprehensive Water Use Planning (WUP) process.

Water Use Planning

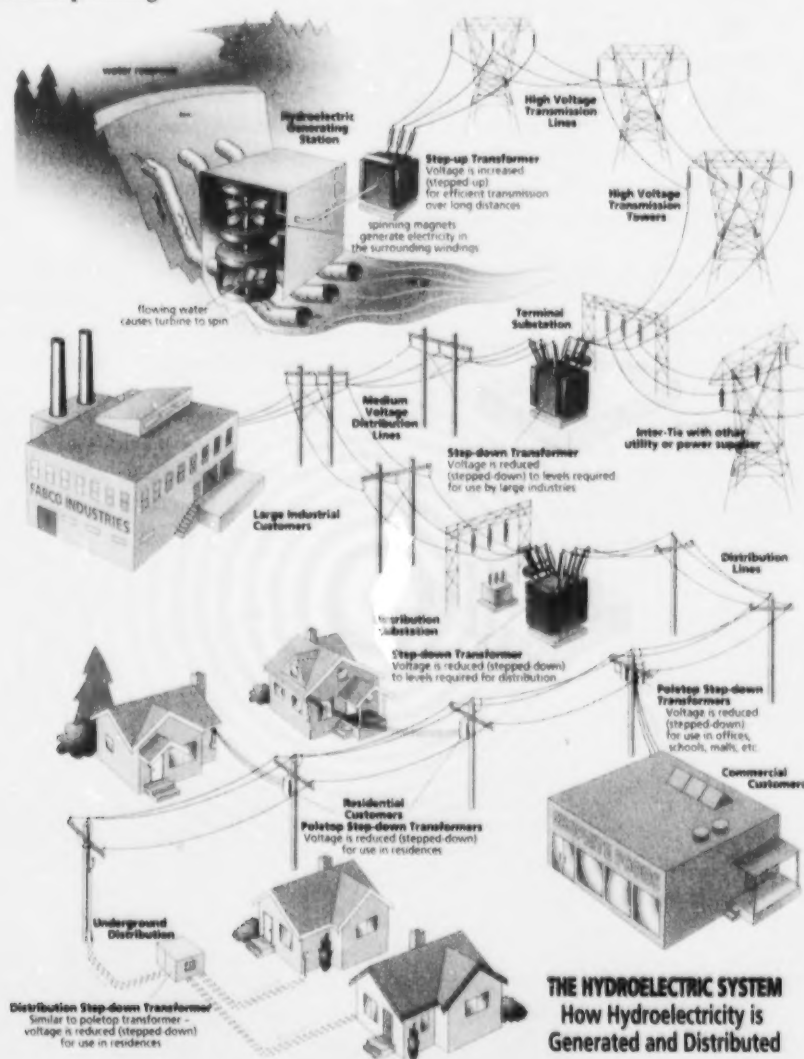
The use of water to generate electricity is regulated by water licences. In 1996, BC Hydro and the Government of British Columbia initiated a review process to ensure that use of the province's water resource reflects today's environmental, social and economic values. This review process provides us with an opportunity for open and accessible water management planning that will lead to better understanding, acceptance and support for important water use decisions.

The water use planning process will provide clear and understandable boundaries within which to operate and plan for future electricity supply. In some cases, the water use planning process may result in certain facilities operating at reduced capacity in the interests of maintaining fish flows, recreation, and other considerations. In these cases, replacement power will be required.

The water use planning process may ultimately affect some, if not all, of our current water use practices and the water licences within which we operate. In some cases, while water management

planning for specific facilities takes place, we may operate under interim water licences. We welcome input on our water management practices and will seek multi-party consensus on tradeoffs between competing uses.

In Making the Connection, we provide information regarding the management of water at each of our facilities. We encourage readers who require detailed, current information regarding water management practices at any of our facilities visit our web site at www.bchydro.com or call: 1-800-663-1377.



THE HYDROELECTRIC SYSTEM
How Hydroelectricity is
Generated and Distributed

THE BC HYDRO ELECTRIC SYSTEM

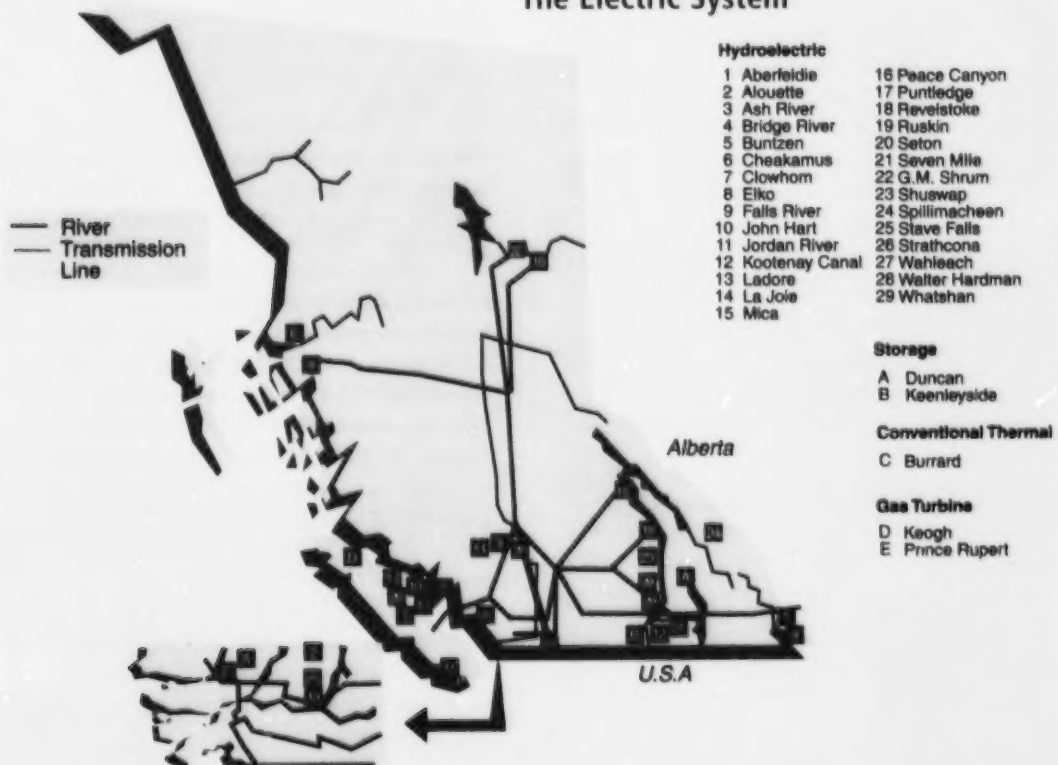
Hydroelectric Generation, Transmission and Distribution

For centuries, the power of moving or falling water has been used to produce mechanical energy. For example, water wheels have been employed to operate mills for grinding grain and pumps to alleviate flooding. BC Hydro uses this same principle of streamflow and falling water to generate electricity. When consumers switch on a light, insert a plug into an outlet, use appliances, start up a computer, or turn up a thermostat, they use electricity, which is instantaneously produced and delivered by an extensive and complex system based primarily on the ability to capture the power of streamflow.

The energy of streamflow is captured and controlled by dams. Storage dams hold water in reservoirs for use throughout the year. "Run-of-river" dams operate using the streamflow of a river. As water flows through penstocks it contacts the blades of a turbine, causing it to rotate. The turbine shaft is attached to a generator. When the turbine rotates, the generator is driven. The generator converts the mechanical rotational energy into electric energy.

The electric energy, produced by the generators at low voltage levels, is transformed to high voltage energy and carried long distances to the demand centres by high voltage transmission lines. Terminal stations control energy flow in the transmission system and reduce voltage levels. Large industrial consumers can accept electricity at medium voltages. At distribution substations, voltages are reduced again for the needs of residential and commercial customers, and for small and medium industrial customers. (see diagram, previous page)

The Electric System



IMPORTANT NOTE CONCERNING THE FOLLOWING PAGES

**THE PAGES WHICH FOLLOW HAVE BEEN FILMED
TWICE IN ORDER TO OBTAIN THE BEST
REPRODUCTIVE QUALITY**

**USERS SHOULD CONSULT ALL THE PAGES
REPRODUCED ON THE FICHE IN ORDER TO OBTAIN
A COMPLETE READING OF THE TEXT.**

REMARQUE IMPORTANTE CONCERNANT LES PAGES QUI SUIVENT

**LES PAGES SUIVANTES ONT ÉTÉ REPRODUITES EN
DOUBLE AFIN D'AMÉLIORER LA QUALITÉ DE
REPRODUCTION**

**LES UTILISATEURS DOIVENT CONSULTER TOUTES
LES PAGES REPRODUITES SUR LA FICHE AFIN
D'OBTENIR LA LECTURE DU TEXTE INTÉGRAL**

THE TRANSMISSION AND DISTRIBUTION SYSTEM

The BC Hydro high voltage transmission and distribution network consists of 17,800 kilometres of transmission lines (60 kilovolts and above) and 52,600 kilometres of distribution lines (below 60 kV).

The 500 kV bulk transmission network connects the major generators in the Northern and South Interior regions of the province with the major load centres in heavily populated southwest B.C. Electricity is supplied to the Lower Mainland and Vancouver Island from the Peace River hydroelectric system through Kelly Lake Substation and from the Columbia River system through Nicola Substation. The illustration on page six shows the relationship between installed generation capacity and electrical demand in the various regions of the province. This relationship drives the development and operation of BC Hydro's bulk transmission system.

BC Hydro's 500 kV bulk transmission system is planned and operated so that at any time, even during peak load periods, the system can withstand an outage of any single transmission line or other transmission element without loss of electrical load. There are exceptions to this rule, such as areas served by single radial lines. In general, the bulk transmission system must comply with the system reliability performance criteria. Compliance with BC Hydro and industry planning and operating standards is also required.

The economic life of overhead transmission lines is 30 to 45 years, of underground and submarine cables less than 40 years, and that of substation facilities about 30 years.

The first 500 kV transmission system was built in 1968-70 for the Peace River hydroelectric generation development (G.M. Shrum).

Some of the major transmission and station facilities are aging and near the end of useful life, eg. the high voltage direct current (HVDC) and 138 kV alternating current (AC) cable interconnections to Vancouver Island and the Series Capacitor Station equipment at Creekside and McInnes. Creekside Series Capacitor Station is presently being rebuilt.

500 kV Transmission System and Major Generating Stations



Interconnections

Buying and selling electricity (electricity trade) and emergency support are possible because the transmission network is interconnected with Alberta, West Kootenay Power and Cominco in southeast B.C., the Alcan system on the North Coast, and the Bonneville Power Administration (BPA) and interconnected systems in the western United States.

The B.C./Alberta intertie export capability is rated at 1,200 MW (operating to a normal limit of 800 MW at present), while the import capability is 1,000 MW.

BC Hydro interties with BPA with two 500 kV links on the west side and two 230 kV links on the east side. The B.C./U.S. intertie export capability is rated at 3,150 MW, (2,850 MW west side, 300 MW east side) while the import capability is 2,000 MW. BC Hydro's "west side" export capability is restricted in heavy load periods by the transfer capability of the Interior to Lower Mainland 500 kV transmission system, since this part of the system must transmit both BC Hydro's "west side" exports to the United States and much of BC Hydro's domestic load. Seventy per cent of this load is in the Lower Mainland and Vancouver Island while generation in these regions totals only 15 per cent.

Intraregional Transmission

Following is a brief description of BC Hydro's regional transmission system.

Northern Region Transmission

The Northern Region 500 kV transmission system collects generation in excess of local demand from G.M. Shrum, Peace Canyon, northern IPPs, and purchased power from Alcan on the north coast for delivery to southwest B.C. via Kelly Lake Substation. Regional load is served from 60 kV to 287 kV transmission systems fed from the major transmission hubs.

The North Coast bulk transmission system consists of one 500 kV line from Williston Substation to Skeena Substation. This system enables interchange and emergency support with Alcan's 287 kV power system at Kitimat and also serves regional loads from 60 kV to 230 kV transmission systems centered at Rupert and Skeena substations.

South Interior Transmission

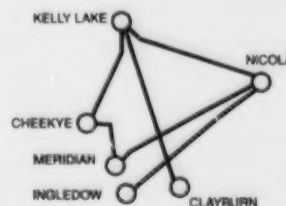
The South Interior Region bulk transmission system collects generation from the Columbia, Kootenay, and Pend d' Oreille river systems, as well as purchased power from Alberta, for subsequent delivery to southwest B.C. via Nicola Substation. Regional load is served from 60 kV to 230 kV transmission systems centered at the Nicola, Savona, Vernon, and Cranbrook substations.

The South Interior bulk transmission system also enables energy interchanges and emergency support with Alberta across one 500 kV line between BC Hydro's Cranbrook Substation and Alberta's Langdon Substation, near Calgary, and two 138 kV transmission lines from BC Hydro's Natal Substation to TransAlta's Pocaterre and Coleman substations, near the B.C./Alberta border.

BC Hydro conducts various forms of electric interchange with the West Kootenay Power and Cominco power systems at South Interior interchange points near BC Hydro's Kootenay Canal Generating Station and Vernon Substation.

The Interior to Lower Mainland System

The Interior to Lower Mainland bulk transmission system consists of five 500 kV transmission lines, four of which directly supply the Lower Mainland load centre via the Kelly Lake, Nicola and Cheekye substations. These four lines are equipped with mid-line series capacitors to increase their power transfer capability. The fifth line, between Kelly Lake and Nicola, provides increased power transfer capability to the Lower Mainland load centre.



The Vancouver Island Transmission System

The Lower Mainland to Vancouver Island submarine cable transmission system supplies approximately 80 per cent of Vancouver Island's electrical demand. Hydro generation on Vancouver Island of approximately 450 MW provides the rest.

Transmission ties to Vancouver Island consist of:

- Two 500 kV circuits from Malaspina substation on the Sunshine Coast to Dunsmuir substation near Nanaimo via Texada Island;
- Two 138 kV submarine cables from Delta supply Saltspring and Galiano islands only; they can supply Vancouver Island, if needed; and
- A high voltage direct current (HVDC) bi-polar tie from Arnott Substation in Delta to Vancouver Island Terminal near Duncan.

Reactive equipment on Vancouver Island helps increase power transfers to Vancouver Island.

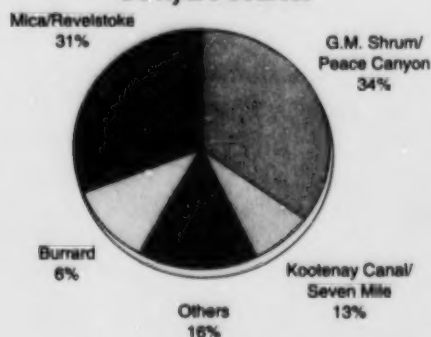
The Electric Generation System

The BC Hydro Electric Generation System extends throughout the various regions of the province. The 29 integrated hydroelectric generating stations, one thermal steam station and two combustion turbine stations have a total maximum sustained generating capacity of approximately 10,800 megawatts (MW). The BC Hydro integrated system produces about 50,000 gigawatt-hours¹ per annum (GW.h/a).

About 80 per cent of BC Hydro's installed generating capacity is at hydroelectric installations in the Peace and Columbia river basins. During the fiscal year ending March 31, 1999, the G.M. Shrum and Peace Canyon generating stations (G.S.) on the Peace River produced about 34 per cent of BC Hydro's electricity requirements. In the Columbia River Basin, Mica and Revelstoke hydroelectric plants together contributed approximately 31 per cent, while Kootenay Canal and Seven Mile generating stations together supplied about 13 per cent. The remaining 23 hydroelectric generating stations supplied just over 16 per cent of electricity production. The Burrard Generating Station, fuelled by natural gas, contributed approximately six per cent.

Generation installations in the Lower Mainland and Vancouver Island regions are very important for providing voltage control for the transmission network, and for system security in the event of transmission line failure. The large storage capacity in Williston and Kinbasket reservoirs also contributes significantly to the security of the hydroelectric system by ensuring a sufficient supply of water for generation for multi-year periods.

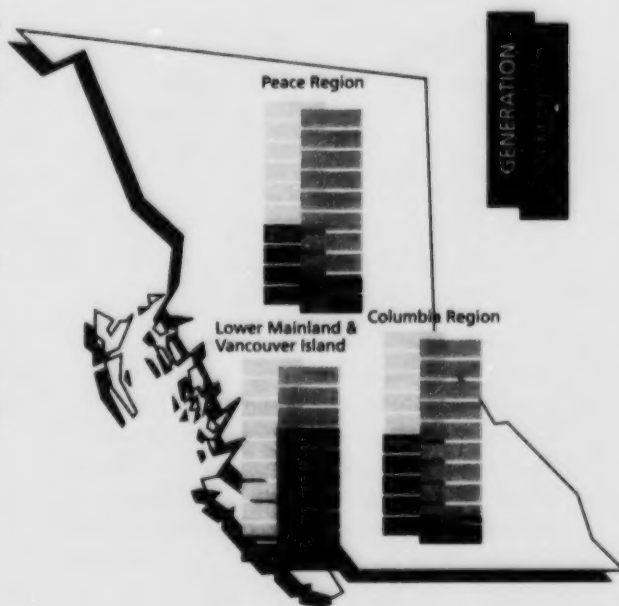
Generation from
BC Hydro Sources



Hydroelectric Generation

System operation planners take into consideration the uncertainties in electricity demand and water inflow. Electricity demand is the term used to describe the amount of electric power required by consumers. Water inflow refers to the amount of water that flows into the rivers and reservoirs and is usable for generation. Demand varies with consumer requirements (hour to hour - season to season) and inflow varies from season to season and year to year with variations in our weather patterns. The generation system must be operated in a way that protects consumers from shortages of electricity in periods of low inflows, and makes the best use of the water available when inflows are at average or higher levels.

Distribution of Electric Power Supply and Demand in British Columbia



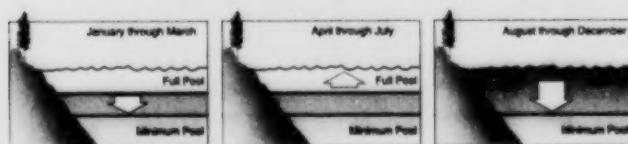
¹ One gigawatt-hour will serve about 100 residential customers for one year.

The Generation-Demand Balance

The energy-producing ability of BC Hydro's electric generation system is measured by energy capability—the average amount of electricity produced under all historical streamflow conditions over a given period, usually one year, and peak capacity—the maximum amount of electrical power that can be produced at any instant. Because electric power cannot be stored, electricity generation must match electric power demand at all times. Having adequate energy capability ensures that BC Hydro can meet the annual demand for electric energy. Having adequate peak capacity enables the electric system to meet the instantaneous peak power demand. In addition, there must be an adequate generation reserve to allow for forecast uncertainties, unscheduled outages, and system dynamics.

In B.C., electricity demand is high during the winter and low during the summer. Conversely, inflows are low during winter, followed by high inflows from runoff in the spring and early summer seasons when the snowpack melts. Demand is also higher during weekdays and lower during the night and on weekends. Reservoir storage is used to bridge the variations in demand and inflow.

Typical changes in reservoir elevation



The energy capability of BC Hydro's system is directly dependent on the volume of water received by the reservoirs, availability of gas to operate Burrard Generating Station, purchases from independent power producers (IPPs) and imports from outside British Columbia. Inflow, however, varies from year to year with weather conditions. Energy studies, based on historical inflow records, indicate that the hydroelectric

High reservoir levels provide:

- more energy from the same amount of water;
- a more secure future supply of electricity; and,
- a higher risk of spilling (wasting) water.

Low reservoir levels result in:

- less energy from the same amount of water;
- a less secure future supply of electricity; and,
- a lower risk of spilling water,

energy capability has varied between approximately 36,500 GW.h for the driest year to 55,900 GW.h in the wettest year. Average capability is 45,600 GW.h. Electricity consumption for BC Hydro within the province in the year ended March 31, 1999, was approximately 49,400 GW.h. This energy consumption is projected to increase by about 1.8 per cent annually.

During years when inflows are high, BC Hydro takes steps to regulate the refill of the reservoirs to meet domestic electricity demand and sell energy surplus to domestic requirements. Inflow in excess of domestic requirements, trade requirements and storage capacity, must be spilled.

In years when inflows are below average, BC Hydro must augment energy supplies to ensure that sufficient energy will be available to satisfy demand by:

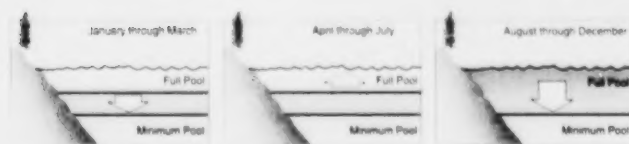
1. conserving water in reservoirs to meet future demand;
2. increasing draft of storage reservoirs;
3. purchasing fuel for thermal plants,
4. purchasing electricity from other power producers.

The Generation-Demand Balance

The energy-producing ability of BC Hydro's electric generation system is measured by energy capability—the average amount of electricity produced under all historical streamflow conditions over a given period, usually one year, and peak capacity—the maximum amount of electrical power that can be produced at any instant. Because electric power cannot be stored, electricity generation must match electric power demand at all times. Having adequate energy capability ensures that BC Hydro can meet the annual demand for electric energy. Having adequate peak capacity enables the electric system to meet the instantaneous peak power demand. In addition, there must be an adequate generation reserve to allow for forecast uncertainties, unscheduled outages, and system dynamics.

In B.C., electricity demand is high during the winter and low during the summer. Conversely, inflows are low during winter, followed by high inflows from runoff in the spring and early summer seasons when the snowpack melts. Demand is also higher during weekdays and lower during the night and on weekends. Reservoir storage is used to bridge the variations in demand and inflow.

Typical changes in reservoir elevation



The energy capability of BC Hydro's system is directly dependent on the volume of water received by the reservoirs, availability of gas to operate Burrard Generating Station, purchases from independent power producers (IPPs) and imports from outside British Columbia. Inflow, however, varies from year to year with weather conditions. Energy studies, based on historical inflow records, indicate that the hydroelectric

High reservoir levels provide:

- more energy from the same amount of water;
- a more secure future supply of electricity; and,
- a higher risk of spilling (wasting) water.

Low reservoir levels result in:

- less energy from the same amount of water;
- a less secure future supply of electricity; and,
- a lower risk of spilling water,

energy capability has varied between approximately 36,500 GWh for the driest year to 55,900 GWh in the wettest year. Average capability is 45,600 GWh. Electricity consumption for BC Hydro within the province in the year ended March 31, 1999, was approximately 49,400 GWh. This energy consumption is projected to increase by about 1.8 per cent annually.

During years when inflows are high, BC Hydro takes steps to regulate the refill of the reservoirs to meet domestic electricity demand and sell energy surplus to domestic requirements. Inflow in excess of domestic requirements, trade requirements and storage capacity, must be spilled.

In years when inflows are below average, BC Hydro must augment energy supplies to ensure that sufficient energy will be available to satisfy demand by:

1. conserving water in reservoirs to meet future demand;
2. increasing draft of storage reservoirs;
3. purchasing fuel for thermal plants,
4. purchasing electricity from other power producers.

Thermal Generation

The 912.5 MW Burrard Generating Station, near Vancouver is an important part of BC Hydro's electrical system. As well as being located in the Lower Mainland where electricity demand is greatest, it is fuelled by natural gas. This alternate source of energy enables BC Hydro to generate additional energy at times of emergencies or when it is economical.

Burrard G.S. has a capability of about 7,230 GW.h/a. This capability is based on estimates of unit availability after allowances for planned maintenance and forced outages, and relative fuel costs.

BC Hydro also operates two combustion turbine generating stations, one located at Prince Rupert and one near Port Hardy on northern Vancouver Island. They are primarily intended to provide reserve capacity and short-term energy during transmission interruptions in these areas. These generators can increase system capacity by about 90 MW.

Thermal Generation Capacity



Environmental, Social and Economic Considerations

BC Hydro has implemented a variety of operating measures designed to reduce operational impacts on the environment and to enhance social benefits. While these measures provide benefits to the province, they can result in losses of electricity production. Some of these considerations include water management for domestic water supply, flood control, water transport, recreation, and protection of aquatic and terrestrial habitat. Thermal operations are optimized to reduce air quality impacts.

Some of these operational requirements are specified in water licences and other regulatory obligations, and provincial and federal government agencies can also require flow releases for various uses such as fisheries. Controlled flow releases downstream from a dam maintain and enhance fish and aquatic habitat. Benefits include increased fish production, improved water quality, ecosystem preservation and improved quality of recreational experiences. Fish flow releases are currently provided downstream from most BC Hydro dams.

Debris removal from reservoirs increases recreational opportunities and provides aesthetic improvement, while trees and other vegetation planted at various locations improve visual appearance and create additional fish and wildlife habitat.

Reservoir levels are lowered prior to a period of high inflow to reduce the risk of a spill event and potential flood damage to property and fish habitat.

The Burrard Generating Station has undergone a major upgrade using Selective Catalytic Reduction (SCR) technology, which reduces the emission of nitrogen oxides by 90 per cent, to improve the air quality in the Lower Mainland.

BC Hydro is committed to delivering electricity in an environmentally and socially responsible manner. The first environmental priority is to avoid causing impacts. However where impacts are created, Hydro works to reduce those impacts, enhance affected habitat and sustain resources over the long term.

Impacts of high voltage transmission lines are mitigated through route location and siting decisions which attempt to avoid sensitive ecological areas and important fish and wildlife habitat, and by minimizing land use and aesthetic impacts. Throughout the process, BC Hydro consults with a broad range of interests, including the public, First Nations, government agencies and regulatory bodies, and a variety of technical experts.

BC Hydro maintains vegetation along 70,400 kilometres of transmission and distribution lines and in over 300 electrical facilities and storage yards. Contact between vegetation and powerlines is a hazard to public safety and system reliability. Vegetation growth on transmission line rights-of-way is controlled by a range of manual, mechanical or chemical techniques. An integrated vegetation management system is used to select the appropriate treatment for each site to encourage the establishment of stable, low-growing plant communities. Compatible uses of rights-of-way are promoted where feasible. Along distribution lines, proper arboricultural practices are used to prune vegetation to within a prescribed distance of the line and to redirect growth away from the lines. Hazard trees which may fall onto lines are removed.

Environmental staff conduct programs to account for heritage, fish and wildlife resources. Impacts on riparian habitats are identified, and enhancement and mitigation projects are carried out to improve conditions along rivers and streams influenced by operations. Measures are taken to prevent electrocution of birds or animals on powerlines and in substations, using bird guards, diverters, perch inhibitors, or by modifying line configurations.

Materials handling and storage practices are in place to prevent or minimize spills and their resulting influences on water and land resources. Recycling programs are designed to minimize waste, for example, the conversion of old utility poles into dimension and specialty lumber or the refurbishing and reuse of line hardware.

BC Hydro's Role in Open Access

BC Hydro was the first Canadian utility to provide open transmission access for wholesale transmission services (WTS). Under WTS, BC Hydro offers short-term market priced point-to-point firm and non-firm transmission services as well as long-term, firm Network Integration and point-to-point transmission services at up to embedded cost prices. Under the non-firm service, BC Hydro may interrupt the transmission contract for economic reasons, such as accommodating another buyer who is willing to purchase the more expensive firm service. Firm service customers cannot be economically interrupted. As well, BC Hydro will consider reinforcing its system to accommodate a long-term firm transmission service request. If BC Hydro transmission reinforcements are necessary, the customer may be required to contribute toward the cost of the upgrade.

In 1996, BC Hydro established an OASIS (Open Access Same-time Information System) site that permits its WTS registered users to make reservations of BC Hydro transmission capacity and to post available transmission capacity and total transfer capability, with associated prices, for specified time periods ranging from the next 168 hours to monthly capacity for the ensuing year.

Power Marketing and Electricity Trade

Power marketing and electricity trade help optimize the value of BC Hydro's system resources, improve the security and reliability of electricity supply for the province, and provide significant financial benefits to the economy and the people of British Columbia.

Electricity trade is possible because BC Hydro's bulk transmission network is interconnected in:

- 1) southeast B.C. with those of West Kootenay Power, Cominco, and Alberta.
- 2) the North Coast with that of the Alcan system, and
- 3) the Lower Mainland and southeast B.C. with that of Bonneville Power Administration and thereby the western U.S. interconnected system.

This transmission network links BC Hydro to the market for the purchase and sale of wholesale electricity outside the province, primarily in the Western U.S. and Alberta. And BC Hydro, through Powerex—its wholly owned power marketing subsidiary—has become a key participant in the wholesale electricity marketplace.

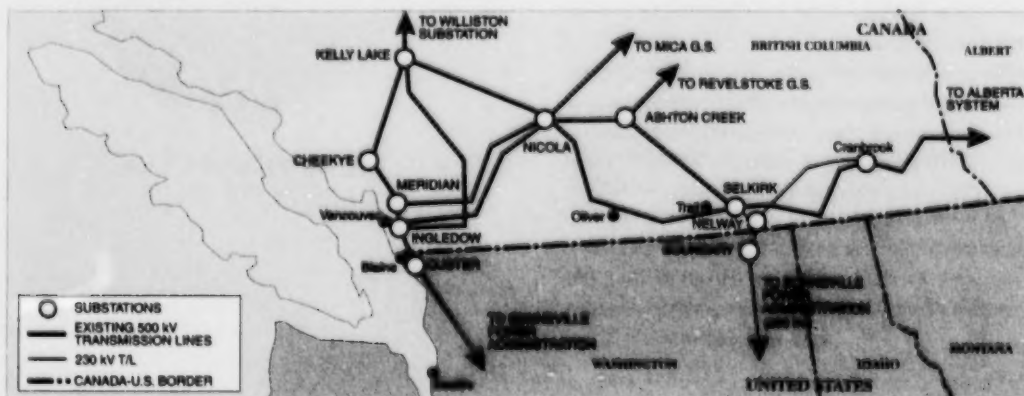
BC Hydro is in a unique position to take advantage of market opportunities because most of its electric system (about 90 per cent in any given year) is hydroelectric and some of its facilities have large water storage reservoirs. This means that BC Hydro is able to use its reservoirs to continue to store water (energy in waiting) when

Powerex can purchase low-priced electricity from the market, and then can generate electricity for Powerex to sell to the market when prices are higher. This is also known as the ability to 'shape' generation to maximize value.

The flexibility of BC Hydro's electric system also enables Powerex to take advantage of differences in demand between the winter-peaking north and summer-peaking south, and between heavy-use and light-use hours. General trends exist both seasonally and daily, corresponding to fairly predictable fluctuations in supply and demand. Seasonally, the price of electricity in the marketplace will be higher during the cold winter months with an increase in heating, and again during the warmer summer months when the use of air conditioning increases. Daily price fluctuation also exists. Prices increase during working hours and drop overnight when activity is low. The phrase 'peak hours' refers to the time period during which demand (load), and thus prices, are high. Alternatively, the phrase 'off-peak hours' refers to the period during which demand (load), and thus prices, are low.

Electricity trade to improve the efficiency of resource use also occurs between predominantly hydro-based systems because of differences in streamflow runoff patterns. When streamflows are high at British Columbia's hydroelectric generating stations, water surplus to BC Hydro's immediate needs can be used to generate electricity to support a neighbouring utility which may be experiencing lower streamflow conditions. Similarly, the neighbouring utility could be called on to support BC Hydro when low streamflow conditions occur in British Columbia.

Interties to Alberta and the U.S.



OPERATIONS PLANNING

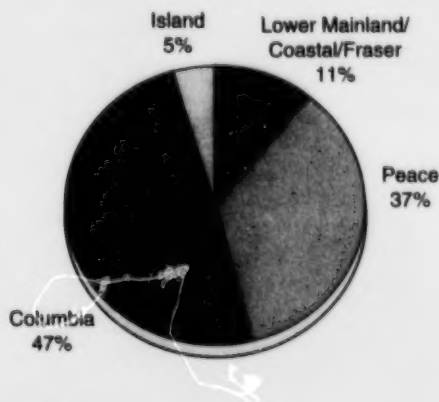
The operation of a large and complex electric system requires careful study and continuous planning. BC Hydro must plan ahead to account for the variable factors that can affect the hour-to-hour, day-to-day, and long-term supply of electricity.

Planning is guided by:

- safety of lives and property
- legal obligations
- present and future power demand
- maximizing the value of generating resources

The planning process requires a wide array of input information such as weather forecasts, domestic load forecasts, economic parameters, market forecasts, water supply forecasts, and fuel price and availability. In addition, system constraints, individual component constraints, dam safety, flood routing, environmental, and other physical data are taken into account. Computer models are employed to simulate the operation of the hydroelectric system to maximize the financial value of system output while meeting system and plant constraints. These modeling studies are designed to indicate how the electric system can operate under varying forecasts.

Regional Hydroelectric Generation Capacity



BC Hydro divides its complex operations planning process into time horizons:

1. Long-Term System Planning
2. Medium-Term Operations Planning—one to four years
3. Short-Term Operations Planning—next day to 12 months
4. Same-Day Operations

Long-Term System Planning

An electric generation system must have sufficient firm energy capability and peak capacity to meet electricity demand. Long-term system planning ensures that adequate resources will be available to meet future electricity demands. Resource acquisition requirements are determined in accordance with policy and to balance supply and demand.

Long-term integrated electricity planning (IEP) studies are conducted to develop and analyze resource portfolios for the future. The IEP process includes a consideration of environmental and social factors in addition to the economic and cost factors.

Medium-Term Operations Planning

Medium-term operations planning provides guidance for marketing decisions and for the operation of the electric system. Studies are performed to evaluate the capability of the existing system to meet operations requirements, given the uncertainties of inflow and electricity demand, and various operating factors.

Several operational planning studies are prepared each month to determine the status of the system in order to provide guidance for operating and import/export decisions. These studies, using the current load forecast, Independent Power Producer contracts, import/export agreements, firm trade contracts, West Kootenay Power, Skagit Treaty, and Cominco Basic Supply obligations, are reviewed monthly and updated as necessary.

Marginal Cost Studies

Marginal Cost of Energy Studies provide information to assist in making decisions about when to operate thermal plants, when to conduct maintenance of generating equipment, and whether to purchase or sell energy. The Marginal Cost Model computes the marginal value of water stored in Williston Reservoir, determines the optimal economic operation of the system, and assesses the adequacy of supply under a range of weather conditions.

System Operating Plan Studies

Each month, a system plan for the next several weeks is produced which incorporates the most current information on reservoir conditions, generation maintenance plans, snowpack conditions, expected Columbia Treaty operating obligations, large-scale non-power operating constraints, expected IPP generation, system load conditions, and import/export commitments. The plan is used to identify additional import/export opportunities, estimate transmission requirements, identify potential maintenance scheduling problems, forecast reservoir levels, adjust thermal project operations, adjust Columbia River non-Treaty storage operations, and evaluate the impact of the significant non-power constraints.

Short-Term Operations Planning

The purpose of this planning function is to define operating plans for each reservoir, generating station, and individual generating units in order to meet domestic and contracted power requirements.

Inflow Forecasts

Since the energy capability of the BC Hydro system is dependent on the amount of water inflow to the rivers and reservoirs, forecasting inflow is an important step in the planning process. Two types of inflow forecasts are performed: five-day short-term inflow forecasts, and seasonal water supply forecasts.

The five-day inflow forecast uses weather forecasts combined with current watershed conditions (e.g., snow accumulation) to produce inflow forecasts for each reservoir. Results are employed to update short-term plans to meet changing system conditions.

Seasonal water supply forecasts estimate inflow volumes for the reservoirs from February to September, based on the amount of accumulated snowpack and historical precipitation. Results are used in a number of planning models to determine seasonal operating strategy.

Short-Term Operations Studies

Short-Term Operations Studies focus on the more predictable aspects of operational problems, and are used for system analysis and the determination of reservoir, generating station, generating unit and interchange schedules. Forecasts of electricity demand and inflow along with system maintenance requirements are considered in order to provide operational schedules and guidelines for the power dispatchers. Short-term studies are typically performed over a time horizon of one day to two weeks, based on hourly time intervals and up to one year in weekly time intervals.

Same-Day Operations

Same-Day Operations planning meets demands and contractual power agreements with power production, hour by hour. The plans are adjusted hourly to meet changes in conditions during the day. The hour-by-hour generation schedules are forwarded to the generation operations centres for implementation.

THE GENERATION SYSTEM

Following is a brief description of BC Hydro's regional generation systems.

Peace Region

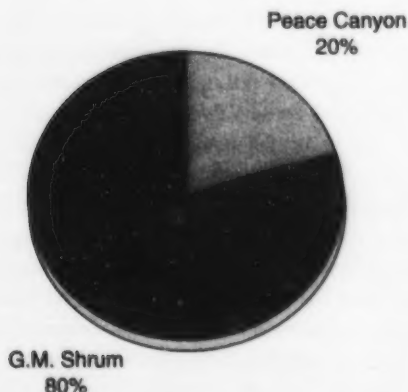
There are two major power generating stations in the Peace River Basin.

The G.M. Shrum Generating Station is the largest powerplant in the system with 10 generating units able to produce a maximum sustained generating capacity of 2,730 MW. The 183-metre-high W.A.C. Bennett Dam creates Williston Reservoir, BC Hydro's largest storage reservoir.

Located 23 kilometres downstream of G.M. Shrum G.S., the Peace Canyon G.S. has four units capable of producing a maximum sustained generating capacity of 694 MW. This generating station uses the same amount of water as the G.M. Shrum G.S. but has lower output because the height of the dam is lower (power output per volume of water is proportional to the "head" or height of water above the generators).

Peace River flows downstream of Peace Canyon G.S. are controlled by regulating the flow at the powerplant, in accord with licences and agreements. Minimum flows are specified at the Peace Canyon G.S. and at Taylor, B.C. These flow requirements are necessary to preserve fish stocks and provide for domestic water supply.

Hydroelectric Generation
Capacity: Peace Region



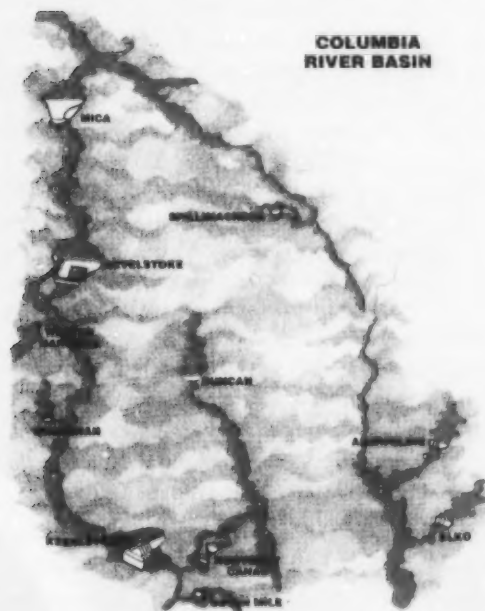
The Peace River freezes over in winter, and the formation and spring breakup of the ice cover can cause ice jams and downstream flooding. To alleviate this problem, the discharge from the Peace Canyon G.S. is kept at a constant high flow during ice formation to maximize the hydraulic capacity of the river. After the ice cover forms, wider fluctuations in flow can be tolerated. During spring breakup, ice jams and high inflows from tributaries downstream of the generating stations can cause flooding. This flooding can be beneficial to the Peace-Athabasca Delta for environmental reasons, but can cause serious problems at the town of Peace River, Alberta. British Columbia and Alberta have established procedures to mitigate flooding at the town of Peace River by regulating Peace Canyon G.S. discharge.

The maximum operating elevation for Williston Reservoir specified in BC Hydro's water licence is 672.08 metres (2,205 feet). The reservoir contains about 39,462 million cubic metres (32 million acre feet) of live storage capacity. Low reservoir levels may impact forest industries and the dilution of effluents discharged into the reservoir.

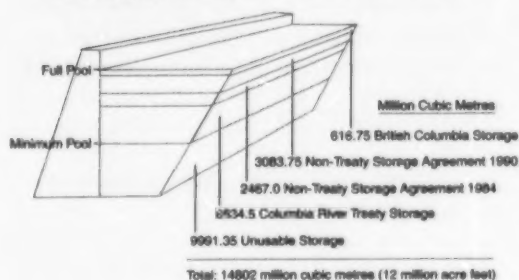
Columbia Region

Power developments on the Columbia River or its tributaries are directly affected by the Columbia River Treaty signed by Canada and the United States in 1961. There were two fundamental reasons for the Treaty: the need to prevent periodic and sometimes devastating floods, and the requirement for additional power. A further agreement signed between Canada and B.C. transferred the obligations and benefits of the Treaty to B.C. In return for building three dams (Mica, Hugh Keenleyside, Duncan), B.C. is entitled to half the additional power generated in the U.S. that resulted from storage operations in Canada. These "downstream benefits" were sold to a group of American utilities for 30 years. This share, known as the "Canadian Entitlement", is owned by the Province of B.C. and the province is taking delivery of this power as of 1998.

The Mica G.S. has four generating units and has been built to accommodate two additional units. The maximum sustained generating capacity is 1,805 MW. The present capacity captures most of the energy available. The additional units can be installed when additional capacity is required.



Storage Allocation at Mica Dam

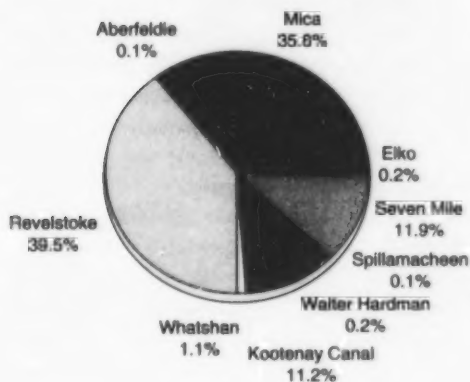


Mica Dam forms Kinbasket Reservoir. The dam was built higher than was required to provide the water storage agreed to under the Columbia River Treaty. Live storage in Kinbasket Reservoir totals approximately 14,800 million cubic metres (12 million acre feet). The maximum drawdown of the reservoir is 47 metres, with typical drawdown in April of about 26 metres. Drafting of the reservoir can affect logging operations and recreational uses.

The Revelstoke Dam and Generating Station, located 130 kilometres downstream from Mica, was constructed to capture benefits from the storage in Kinbasket Reservoir. About 70 per cent of the river flow at Revelstoke is discharged from Mica; the remaining 30 per cent is from local inflow. The Revelstoke G.S. is the second largest powerplant in the BC Hydro system, with four generating units producing approximately 1,980 MW. There is provision for the installation of two additional units. Revelstoke operates as a run-of-river generating station. Normal fluctuation in reservoir elevation is one metre, but may be up to 17 metres in severe conditions.

Downstream of Revelstoke, the Arrow Lakes Reservoir is formed by the Hugh Keenleyside Dam. This dam currently provides only storage; however, Columbia Power Company and Columbia Basin Trust are developing a 170 MW powerplant at the site, planned for completion in 2002. Fluctuations in water levels can affect logging, recreation and fish habitat. Low reservoir elevations at certain times of the year can be a factor in the exposure of sediments that can lead to dust storms in the upper part of the reservoir. Seeding programs have significantly reduced the magnitude and occurrence of the dust storms.

Regional Hydroelectric Generation Capacity: Columbia Region



Duncan Dam is located on the Duncan River, north of Kootenay Lake. Both Libby and Duncan dams discharge water into Kootenay Lake.

The Kootenay River originates in the Rocky Mountains near the source of the Columbia River and flows south. Under the terms of the Columbia River Treaty, Libby Dam was built on the Kootenay River in the U.S. The upstream portion of the resulting reservoir, Lake Koocanusa Reservoir, backs up into Canada. Additional flow required for spawning sturgeon below Libby Dam and for downstream salmon migration in the Columbia results in lower summer levels on Lake Koocanusa Reservoir, which can affect recreation. The Kootenay River turns north downstream of Libby Dam, re-enters Canada, and flows into Kootenay Lake.

West Kootenay Power has four generating stations on the Kootenay River: Corra Linn; Upper Bonnington; Lower Bonnington; and South Slokan. Following the construction of Libby Dam, the additional generating potential in this part of the river was captured by the construction of the 570 MW Kootenay Canal G.S. The operations of these generating stations are coordinated under the Canal Plant Agreement to make efficient use of the water available.

Downstream of Kootenay Canal is Columbia Power Company's (CPC) Brilliant Generating Station, located just upstream from the confluence of the Kootenay and Columbia rivers. Under the coordinated operation, West Kootenay Power and CPC receive the amount of power their generating stations would have produced without the Columbia River Treaty and the Kootenay Canal development.

The Seven Mile G.S. on the Pend d'Oreille River has three generating units with a total generating capacity of 594 MW. There is provision for the installation of a fourth unit. Seven Mile is located between Seattle City Light's Boundary Dam G.S. and Cominco's Waneta G.S.

There are five other smaller hydroelectric generating stations in the Columbia Region. The 5 MW Aberfeldie G.S. on the Bull River is essentially a run-of-river facility, with water flowing over the spillway much of the year. The 12 MW Elko G.S. is located on the Elk River, approximately 26 kilometres from its mouth on Lake Koocanusa Reservoir. The 4 MW Spillimacheen G.S. is on the Spillimacheen River, a tributary of the Columbia River upstream from Kinbasket Reservoir. The 8 MW Walter Hardman G.S. is located on the shore of Arrow Lakes Reservoir. The 54 MW Whatshan G.S. is also on the shore of Arrow Lakes Reservoir and uses Whatshan Lake as its reservoir.

Lower Mainland/Coastal/ Fraser Region

The Bridge River complex is the third largest development in the BC Hydro system (after the Peace and Columbia projects). The complex consists of three distinct components. The La Joie Dam and 25 MW generating station near Bralorne discharges into Carpenter Reservoir, formed by Terzaghi Dam on the Bridge River. The 480 MW Bridge River generating stations use water diverted from Carpenter Reservoir through tunnels to the stations located on Seton Lake Reservoir. The 48 MW Seton G.S. is situated at the east end near Lillooet. Seton Lake Reservoir is kept at a relatively constant level.

The 5.2 MW Shuswap Falls G.S. is on the Shuswap River near Lumby. The operation of this generating station also takes into consideration flow and water quality for fish protection and recreation in the river.

Wahleach G.S. is a 63 MW "high head" station located west of the town of Hope. Jones Lake supplies water for Wahleach. The Stave River generation complex includes the 9 MW Alouette, the 90 MW Stave Falls, and the 105 MW Ruskin generating stations. The two Buntzen stations produce 72.8 MW. Buntzen Lake Reservoir

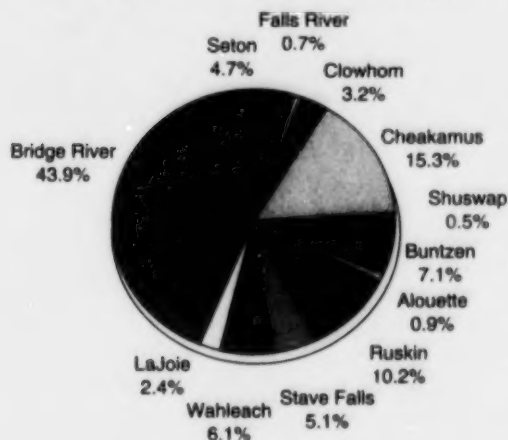


provides fresh water make-up for the Burrard Generating Station. Each of these installations provides facilities for a wide variety of recreational uses.

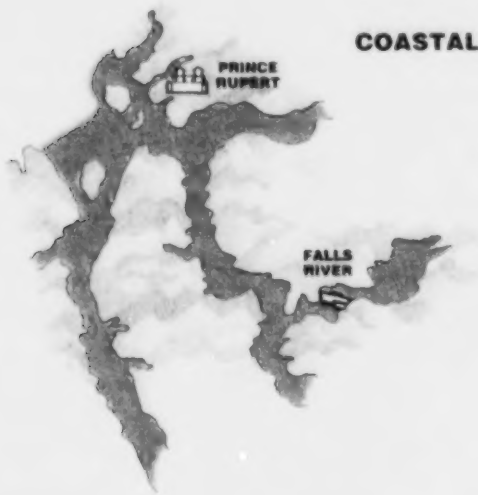
The Cheakamus G.S., located on the Squamish River, is a two-unit, 157 MW facility using water diverted from Daisy Lake Reservoir on the Cheakamus River. Efforts to reduce flooding below the dam during adverse weather conditions often results in rapid reservoir drawdown and filling. The 33 MW Clowhom G.S. is located on the south coast at the north end of Salmon Inlet.

On the north coast, BC Hydro operates the Prince Rupert gas turbine and the Falls River G.S. The Falls River plant is located on the Ecstall River, near the mouth of the Skeena River. Maximum sustained output of this plant is 7 MW. The 46 MW combustion turbine generating station near Prince Rupert is fired by natural gas with diesel backup. The North Coast region is connected to the electric system through transmission lines to Prince George. In addition, there are connections to the Alcan system. BC Hydro purchases surplus power from Alcan's Kemano Project.

Regional Hydroelectric Generation Capacity:
Lower Mainland/Coastal/Fraser Region



The Burrard Generating Station is a 912.5 MW steam turbine generating station, and is an important part of BC Hydro's electrical system. The generating station was built by the B.C. Electric Company as a baseload facility using natural gas and oil fuels. For environmental reasons, the station is now fuelled only by natural gas. The plant contributes to the BC Hydro system in the following manner: provides generation near the load centre in case of emergency; facilitates planned maintenance outages; augments energy production when economical; provides voltage support when generating or when run as a synchronous condenser.



Improvements have been under way in recent years to modernize Burrard, including installation of selective catalytic reduction technology (SCR). SCR technology reduces emissions of Nitrogen Oxide (NOx) by 90 per cent by using a catalyst to convert ammonia and NOx into nitrogen gas and water vapor. In addition, a dechlorination system was installed and has lowered the amount of chlorine in the plant's cooling system to below detectable levels.



Vancouver Island Region

The Campbell River System is comprised of three power generating stations. Buttle Lake and Upper Campbell Lake reservoirs discharge through the 64 MW Strathcona G.S. into Lower Campbell Lake Reservoir. Lower Campbell Lake is the reservoir for the 47 MW Ladore G.S. Ladore G.S. discharges into John Hart Reservoir which is the reservoir for the 126 MW John Hart G.S. Upper Campbell Lake is the storage reservoir for all three installations. Fluctuations in levels of the lower reservoirs are necessary in order to balance water flow through the turbines.

The larger reservoirs of the Campbell River system are popular recreation areas. BC Hydro has ongoing stump removal and debris clean-up programs to improve recreation quality on reservoirs.

The Campbell River has a world famous fishery, and its protection is an important concern to BC Hydro. The river supports spawning grounds for all five species of Pacific Salmon, and both

summer and winter runs of Steelhead. Fish viewing/kayak launching platforms and a fishery information kiosk for the public have been installed. Minimum flows and limitations to the rate of flow changes have been incorporated in the operation of these generating facilities.

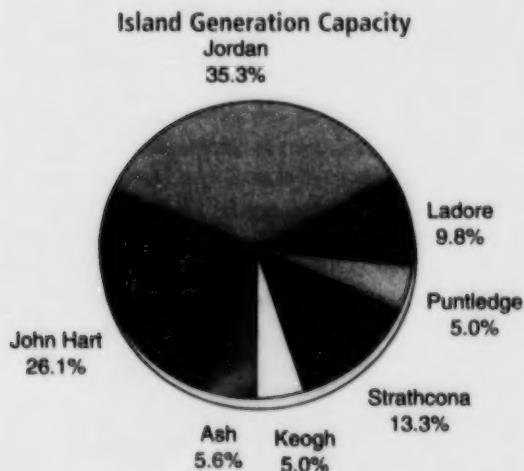
Diversion dams have been constructed on the Quinsam River, Salmon River, Crest Creek and Heber River to supplement the Campbell River system. Each of the diversion dams affects the fishery of the river, and minimum flows required in the water licences are maintained or exceeded. Also, since the issuance of the water licences, a major hatchery complex has been built on the Quinsam River. Removal of a migration barrier on the Salmon River, permitting the construction of a fish ladder at the Salmon River diversion dam by the Fisheries and Oceans Canada, provides salmon and steelhead with access to habitat which had been inaccessible before the dam was built. A fish screen was also constructed, in cooperation with the Ministry of Environment, Lands and Parks, to prevent Salmon River fish from migrating into Campbell River.

The 24 MW Puntledge G.S. is located near Courtenay. BC Hydro and Fisheries and Oceans Canada have collaborated to devise a system of fish screens that protect smolts from passing through the turbines. Since the installation of the fish screens, smolt mortality levels have declined dramatically.

The 27 MW Ash River G.S. is located on the shore of Great Central Lake. The water source for this generating station is Elsie Lake Reservoir. A valve releases water into Ash River to maintain the fishery in the river.

Jordan River G.S. is a 170 MW peaking generating station located between Sooke and Port Renfrew.

The 24 MW Keogh combustion turbine G.S., using diesel fuel, is located at the north end of Vancouver Island. Fuel storage is limited and the generating station's role is primarily as emergency back-up for the single transmission line to the area, and for peak load support.



PROJECT TECHNICAL DATA

GENERATING CAPACITY, INTEGRATED SYSTEM

Hydroelectric

	Kilowatts
Aberfeldie	5,000
Alouette	9,000
Ash River	27,000
Bridge River (plants 1 and 2)	466,000
Buntzen (plants 1 and 2)	72,800
Cheakamus	157,000
Clowhom	33,000
Elko	12,000
Falls River	7,000
G.M Shrum	2,730,000
John Hart	126,000
Jordan River	170,000
Kootenay Canal	570,000
Ladore	47,000
La Joie	25,000
Mica	1,805,000
Peace Canyon	694,000
Puntledge	24,000
Revelstoke	1,980,000
Ruskin	105,000
Seton	48,000
Seven Mile	594,000
Shuswap	6,000
Spillimacheen	4,000
Stave Falls	90,000
Strathcona	64,000
Wahleach	63,000
Walter Hardman	8,000
Whatshan	54,000

Steam Turbine (Thermal)

Burrard	912,500
---------	---------

Combustion Turbine (Thermal)

Keogh	44,000
Prince Rupert	46,000

Note:

1) Maximum sustained generating capacity, based on 1999 operating conditions. Capacity for planning purposes may differ from that above, based on the criteria used to define dependable capacity.

2) Average Energy Capability, listed for each facility on the following pages, uses a 20-year average (1979-98), with the exceptions of Revelstoke and Seven Mile. Revelstoke's in-service date was 1984, so the 15-year average (1984-1998) is used. Seven Mile's average is based on 1989 to 1998.

Aberfeldie

General Information

Project Name:	Aberfeldie
Dam Name:	Aberfeldie
Dam Height:	32 metres
Reservoir Name:	Alberfeldie Headpond
Water Course:	Bull River
Downstream Project:	Libby

Description

Concrete gravity dam with one-kilometre penstock to the two-unit, 5 MW powerhouse. Located 35 kilometres southeast of Cranbrook.

History

Original project was completed in 1922. The dam was rebuilt in 1953. Plant was originally owned by East Kootenay Power Company.

Drainage Basin

Bull River Valley encompassing 1,530 square kilometres.

Inflow

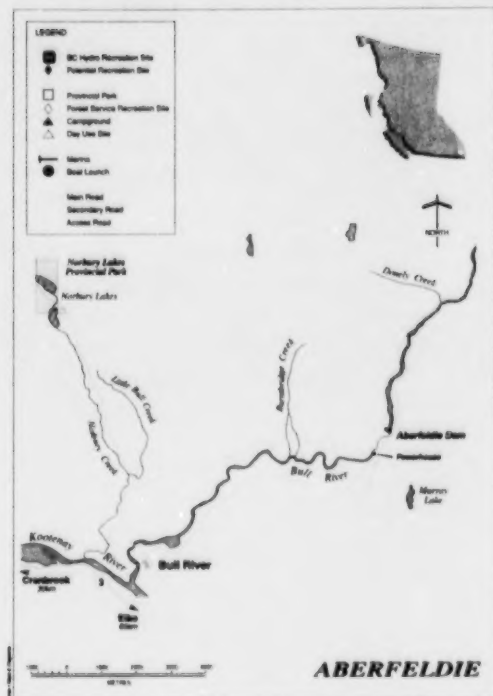
High during spring runoff and tapers off into fall.

Reservoir

The reservoir is small, run-of-river, and spills from spring runoff to the fall (March through November).

Operating Constraints

Normal headpond operating level is El. 877.06 metres. During spring freshet, the headpond rises to a maximum level between El. 878.0 metres and 879.0 metres. When the headpond drops to El. 876.15 metres, the auto-controlled generator will lower output until the turbine is at 30 per cent gate opening.



Capability

Maximum Sustained	
Generating Capacity:	5 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	34 GW.h
	(20-year average)
Storage:	Run-of-river

Alouette

General Information

Project Name:	Alouette
Dam Name:	Alouette
Dam Height:	21 metres
Reservoir Name:	Alouette Lake
Reservoir Area:	1,600 hectares
Water Course:	Alouette River
Downstream Project:	Stave Falls

Description

The Alouette Project consists of a dam at the south end of Alouette Lake Reservoir and a tunnel from Alouette Lake Reservoir to the 9 MW Alouette powerhouse discharging into Stave Lake Reservoir.

History

The dam was built in 1926 and replaced in 1984 with a modern earthfill structure. The power-plant went into service in 1928. The spillway was rehabilitated in 1993.

Drainage Basin

Alouette Lake Reservoir is within Golden Ears Provincial Park.

Inflow

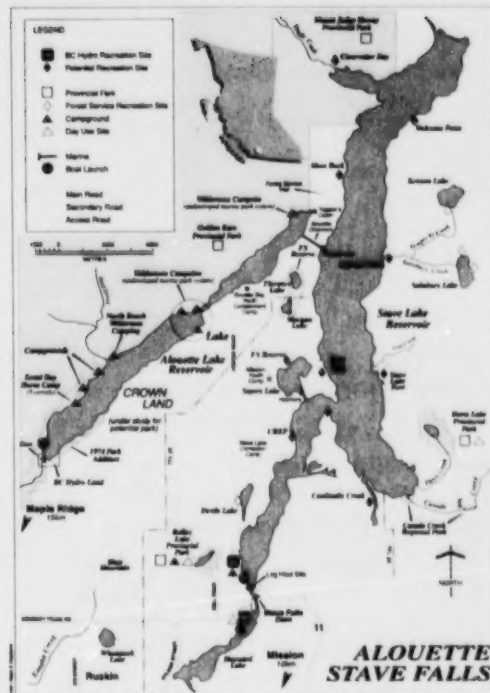
Average annual inflow is about 21 m³/s. Large flood inflows could occur in the late fall.

Reservoir

Reservoir operating range is 9.5 metres between El. 116 metres and El. 125.51 metres.

Operating Constraints

Between Victoria Day and Labour Day, the reservoir must be kept above El. 121.25 m for recreation purposes. Whenever the reservoir is above 122.6 metres from October through March, the adit is opened to pass additional water from Alouette Lake Reservoir to Stave Lake Reservoir for flood control.



For maintenance of fish habitat in the South Alouette River, 2.8 m³/s is release below the dam from the low level outlet on a steady basis.

Capability

Maximum Sustained	
Generating Capacity:	9 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	30 GW.h
Storage:	155 million m ³

Ash River

General Information

Project Name:	Ash River
Dam Name:	Elsie
Dam Height:	19 metres
Reservoir Name:	Elsie Lake
Reservoir Area:	75 hectares
Water Course:	Ash River

Description

An intake on the south shore of Elsie Lake Reservoir diverts water through a tunnel and pipeline about 7.4 kilometres to a 27 MW powerhouse on Great Central Lake.

History

Construction began in 1957 and the unit was placed in service in 1959.

Drainage Basin

The Ash River watershed between the Beaufort Range and Strathcona Provincial Park.

Inflow

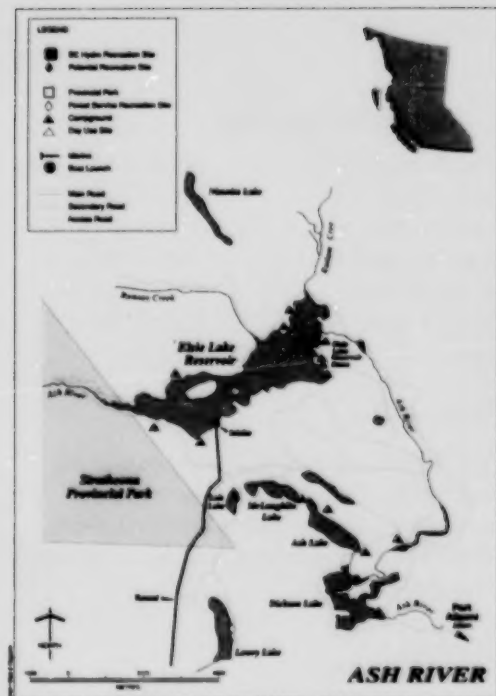
Peak inflow occurs in May from snowmelt. Slightly lower volume but much more volatile peak inflows occur in November due to rainstorms. Average annual inflow is 21 m³/s.

Reservoir

Elsie Lake Reservoir typically spills from October to May because inflows are much greater than turbine capacity during this period.

Operating Constraints

Normal operating range is between El. 315.47 metres to 330.71 metres. The water licence specifies that a minimum instantaneous discharge of 0.71 m³/s from June to August, and a 0.29 m³/s from September to May be maintained immediately downstream from Elsie Lake Reservoir.



In order to conserve water for fish releases, when Elsie Lake Reservoir has been drafted to El. 320 metres, unit output is limited to 10 MW; when the reservoir is drafted below El. 317.9 metres, the turbine is shut down.

To ensure fish propagation in Ash River, year-round monthly average discharge should be at least 3.54 m³/s. The maximum rate of change for low level outlet discharge should be 0.3 m³/s every 15 minutes and if discharge is less than 0.3 m³/s, the maximum rate of decrease should be limited to 0.15 m³/s per hour; these rates of discharge will allow fish immediately downstream of the outlet enough time to adjust to the new flow levels or to vacate the channel if necessary.

Capability

Maximum Sustained	
Generating Capacity:	27 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	193 GW.h
Storage:	77 million m ³

Bridge River

General Information

Project Name:	Bridge River
Dam Name:	Terzaghi
Dam Height:	60 metres
Reservoir Name:	Carpenter
Reservoir Area:	4,800 hectares
Water Course:	Bridge River
Upstream Project:	La Joie
Downstream Project:	Seton

Description

Water is diverted through tunnels and penstocks from Carpenter Reservoir to two powerhouses, each with four generating units, located on Seton Lake Reservoir.

History

The first generator was installed in 1948 and the eighth in 1960.

Drainage Basin

Bridge River drainage basin is in the Coast Mountains.

Inflow

Most inflow is in the spring and summer from snow and glacial melt. Average annual local inflow is about 51 m³/s with another 40 m³/s from La Joie.

Reservoir

Carpenter Reservoir is a storage reservoir with an operating range of about 44.5 metres.

Operating Constraints

Carpenter Reservoir is operated to provide an end-of-season level of no higher than El. 648.9 metres.

Capability

Maximum Sustained	
Generating Capacity:	466 MW
Turbine type:	Vertical shaft, six-jet impulse
Historic Annual Average	
Plant Generation:	2,479 GW.h
	(989 Bridge River 1/ 1,490 Bridge River 2)
Storage:	928 million m ³



Buntzen/Coquitlam

General Information

Project Name:	Buntzen Lake
Dam Names:	Buntzen and Coquitlam
Dam Heights:	16.5 metres (Buntzen) 30 metres (Coquitlam)
Reservoir Names:	Buntzen Lake/ Coquitlam Lake
Reservoir Areas:	185 hectares (Buntzen) 1,250 hectares (Coquitlam)

Description

Water is diverted from Coquitlam Lake Reservoir via a tunnel to Buntzen Lake Reservoir and then by penstocks to two powerhouses on Indian Arm.

History

Original No.1 plant went in service in 1903 and the No.2 plant in 1914. Multi-unit No.1 plant was replaced by a single unit of 55 MW in 1951.

Drainage Basin

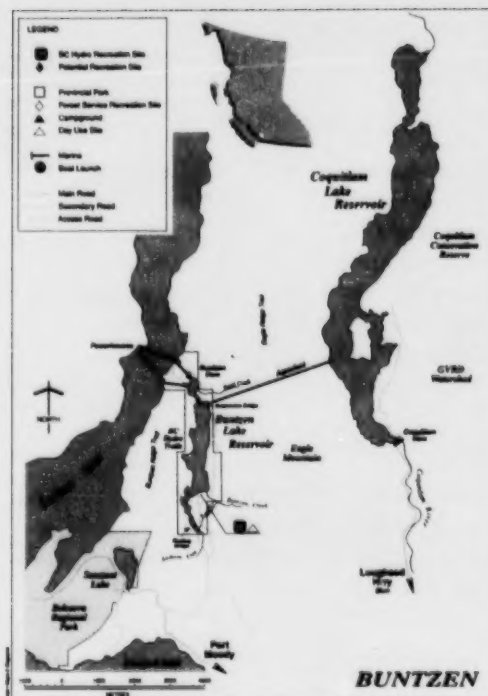
Nearly all the inflow into Buntzen Lake Reservoir comes from Coquitlam Lake Reservoir through the diversion tunnel.

Inflow

Average annual inflow into Coquitlam Lake Reservoir is about 23 m³/s, mainly from heavy winter rains and high level snowmelt.

Reservoir

Buntzen Lake Reservoir with an operating range of 2.81 metres, normal minimum of 120.09 metres and normal maximum of 122.9 metres, has been developed as a recreational area by BC Hydro. Water in Coquitlam Lake Reservoir is also used for domestic water supply and providing fish flow downstream from the dam. Coquitlam Lake Reservoir has an operating range of 17.4 metres,



between normal minimum of 137.48 metres and normal maximum of 154.86 metres.

Operating Constraints

Water must be reserved in Coquitlam Lake Reservoir for domestic consumption by the Greater Vancouver Water District. Fish flow releases are required from the dam. To meet these requirements, monthly minimum elevations need to be maintained.

A minimum level of 118.87 metres is required in Buntzen Lake Reservoir to supply water to Burrard Generating Station. To minimize the potential of flooding downstream of Coquitlam Dam, spilling is considered when the reservoir elevation exceeds 153.86 metres.

Capability

Maximum Sustained Generating Capacity:	72.8 MW
Turbine type:	Francis and horizontal impulse
Historic Annual Average Plant Generation:	183 GW/h (172, Buntzen 1/ 11, Buntzen 2)
Storage for Coquitlam Lake:	202 million m ³

Burrard Generating Station

General Information

Project Name: Burrard Generating Station
Type: Conventional steam electric plant
Fuel: Natural Gas
Back Up Fuel: None

Description

A conventional natural gas-fired, steam electric station consisting of six 150 MW units. All six units are equipped with selective catalytic reduction to reduce their emission of nitrogen oxides.

History

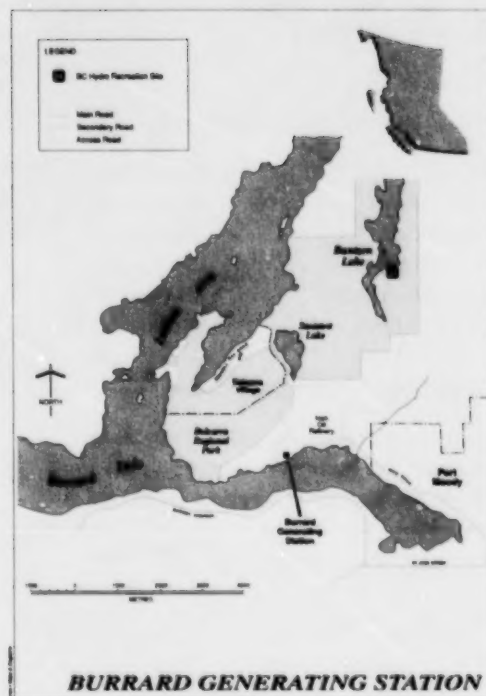
Construction began in 1960. Additional units were added in stages coming into service from 1962 to 1975.

Operating Constraints

Plant operation in the winter is limited due to gas availability (an economic restriction).

The primary environmental management focus area is oxides of nitrogen (NOx) emissions. A second management focus area is carbon dioxide (CO₂) emissions. When the Air Quality Index for NOx or ozone or exceeds 50 for more than one hour at any one of seven local monitoring stations in the Lower Mainland, the operation of the plant is curtailed.

Generation is curtailed when cooling water discharged into Burrard Inlet is greater than 27°C or if the volume exceeds 1.7 million m³/day. Residual chlorine levels in the plant cooling-water effluent are controlled with a dechlorination system to prevent chlorine-produced oxidants from entering Burrard Inlet.



Capability

Maximum Sustained Generating Capacity:	912.5 MW
Turbine type:	Triple expansion reheat steam turbine

Cheakamus

General Information

Project Name:	Cheakamus
Dam Name:	Cheakamus
Dam Height:	29 metres
Reservoir Name:	Daisy Lake
Reservoir Area:	4,300 hectares
Water Course:	Cheakamus River

Description

Water flows from Daisy Lake Reservoir to Shadow Lake Reservoir where a partially lined tunnel and two penstocks carry the water 11 kilometres to the two-unit, 157 MW powerhouse located on the Squamish River.

History

The plant was initially constructed in 1957. Rehabilitation to meet seismic requirements was carried out between 1981 and 1988.

Drainage Basin

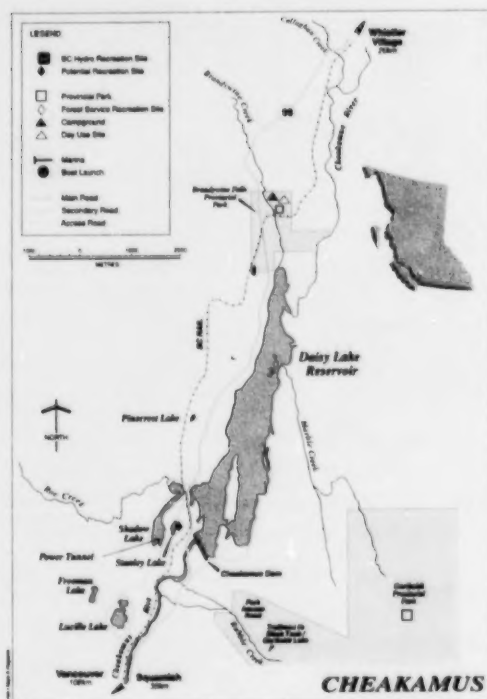
Located in the South Coast Mountains. Intercepts warm Pacific air masses and experiences high annual precipitation. Twenty per cent of annual inflow volume is from snowmelt.

Inflow

Snowmelt runoff occurs May to August and decreases in September. Heavy rains from September to December result in high peak flows. Average annual inflow is 49 m³/s.

Reservoir

Outside of the summer months, Daisy Lake Reservoir is a peaking reservoir and experiences continuous fluctuations in water elevation. It is subject to rapid drawdown and filling. Normal draft limit is 13.0 m, between El. 377.95 metres and El. 364.9 metres. Below 366.7 metres, generation restrictions apply.



Operating Constraints

About 45 per cent of the inflow to Daisy Lake Reservoir is released down the Cheakamus River. Daily flows vary between 37 per cent and 52 per cent to average 45 per cent over a seven-day period, with a minimum flow of five m³/s, to protect rearing fish and incubating eggs in times of low water. The reservoir is drafted in August prior to the fall season to reduce flooding risk downstream from the dam. A ramp-down rate for powerhouse discharges into Squamish River and dam discharges into Cheakamus River are in effect to avoid fish stranding.

Capability

Maximum Sustained	
Generating Capacity:	157 MW
Turbine type:	high head Francis
Historic Annual Average	
Plant Generation:	750 GW.h
Storage:	46 million m ³

Clowhom

General Information

Project Name:	Clowhom
Dam Name:	Clowhom
Dam Height:	22 metres
Reservoir Name:	Clowhom Lake
Reservoir Area:	800 hectares
Water Course:	Clowhom River

Description

Clowhom Lake Reservoir is the containment for a 390 km² area of drainage that flows into Salmon Inlet. Clowhom has a concrete gravity dam. A single 33 MW generator supplies power.

History

The plant was commissioned in 1958 and replaced a smaller 16 MW two-unit plant, owned by B.C. Power Commission, installed in 1952. The existing dam is located just downstream from the older structure.

Drainage Basin

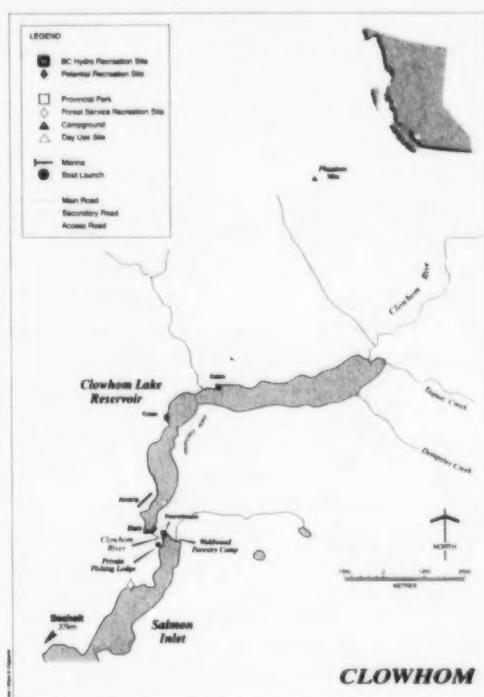
Located within the south Coast Mountains, the basin intercepts warm Pacific air masses and experiences high annual precipitation. Twenty per cent of annual inflow volume is from snowmelt.

Inflow

Snowmelt runoff occurs from April to August and tapers off in September. Heavy rainfall periods occur from September to December and can result in high peak flows. Average annual inflow is 36 m³/s.

Reservoir

Clowhom Lake Reservoir is a peaking plant reservoir and experiences continuous fluctuations in water level. It is normally operated between full pool of 53.34 metres and low level of 42 metres for a total of 11.34 metres of operating range. Below 47 metres generation restrictions apply.



Operating Constraints

Spillgates are normally operated in "automatic" mode, which is triggered at an elevation of 53.37 metres and responds to changes in the reservoir levels.

When the reservoir level exceeds 53.4 metres, it is monitored for flooding. When drafted below 47 metres, fish are monitored for flushing and stranding.

Capability

Maximum Sustained	
Generating Capacity:	33 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	121 GW.h
Storage:	45 million m ³

Duncan

General Information

Project Name:	Duncan
Dam Name:	Duncan
Dam Height:	38.7 metres
Reservoir Name:	Duncan Lake
Reservoir Area:	7,150 hectares
Water Course:	Duncan River
Downstream Project:	Kootenay Canal/Corra Linn

Description

Earthfill dam impounds a storage reservoir.
There is no powerhouse at Duncan.

History

Duncan Dam is one of the three dams constructed in Canada under the terms of the Columbia River Treaty. Construction began in 1965 and the project was operational in 1967.

Drainage Basin

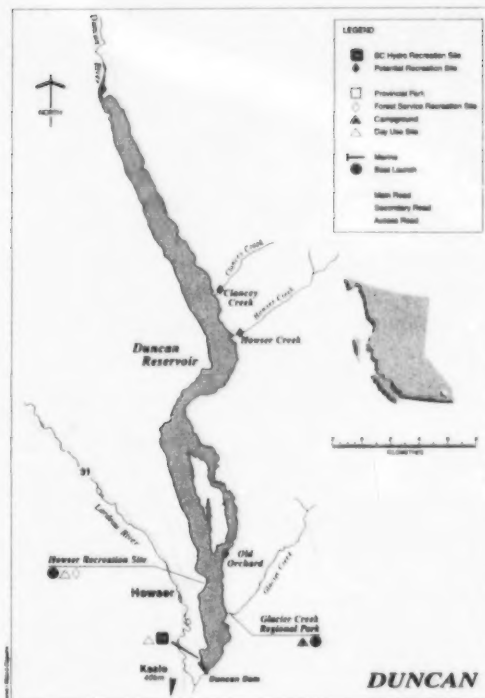
The 2,396 km² area drainage basin receives the largest inflows in May and June from snowmelt. Rainfall inflow is heaviest during the July to September period.

Inflow

Snowmelt dominates; inflows increase rapidly in May, peak in June and taper off to a low of about 17 m³/s in February. Average annual inflow is 102 m³/s. Maximum inflow is 606 m³/s.

Reservoir

The Duncan Reservoir is 45 kilometres long and contains 1,727 million m³ of storage. Average yearly drawdown is about 30 metres. Full pool is usually achieved in July.



Operating Constraints

Duncan Dam is operated under the terms of the Columbia River Treaty.

During May and June each year, the low level outlet is operated similarly to a navigation lock to assist the upstream migration of bull trout.

Capability

Maximum Sustained	
Generating Capacity:	None
Turbine type:	None
Historic Annual Average	
Plant Generation:	None
Storage:	1,727 million m ³

Elko

General Information

Project Name:	Elko
Dam Name:	Elko
Dam Height:	16 metres
Reservoir Name:	Elk Headpond
Reservoir Area:	0
Water Course:	Elk River
Downstream Project:	Libby

Description

Located 70 kilometres southeast of Cranbrook. Concrete dam with a two-unit, 12 MW powerhouse.

History

Built by the East Kootenay Power Company, Elko was completed in 1924.

Drainage Basin

Elk River Valley (3,530 km²).

Inflow

Some valley inflow is used by the communities of Fernie, Sparwood and Elkford, and by Fording Coal Co. and Westar Mining Co. in their operations (consumptive).

Reservoir

Small with little storage. Operates as a run-of-river dam.

Operating Constraints

The optimum winter reservoir operating level is El. 917 metres. When ice covers the reservoir, water level fluctuations are minimized to prevent the ice sheet from damaging flashboards or stoplogs.



Before the spring runoff, the reservoir is drawn down to facilitate the removal of flashboards and stoplogs from the spillways. During the forebay draw down, the ramping rate is kept at or below 15m³/h to help reduce elevated turbidity levels and fish stranding upstream.

To prevent fish stranding downstream of the dam and powerhouse, forebay filling ramp-up rate must allow approximately four hours to reach the desired level.

Capability

Maximum Sustained	
Generating Capacity:	12 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	73 GW.h
Storage:	None

Falls River

General Information

Project Name:	Falls River
Dam Name:	Falls River
Dam Height:	13 metres
Reservoir Name:	Big Falls Headpond
Water Course:	Falls River

Description

Located on the Big Falls River near its confluence with the Ecstall River about 50 kilometres south-east of Prince Rupert. Two-unit powerhouse totalling 7 MW.

History

Built in 1930 for the Northern B.C. Power Company. Acquired by BC Hydro in 1964. Significant rehabilitation work completed in 1992.

Drainage Basin

Big Falls River.

Inflow

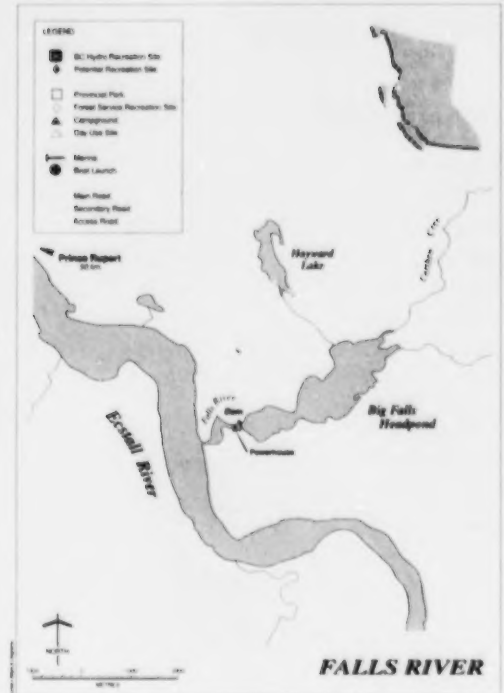
Frequent periods of heavy rainfall.

Reservoir

Headpond undergoes rapid changes in level, spilling at any time.

Operating Constraints

To maintain adequate water supply, a minimum forebay elevation of 83.84 metres is required. A minimum discharge of 1.3 m³/s is required to protect fish.



Capability

Maximum Sustained	
Generating Capacity:	7 MW
Turbine Type:	Francis
Historic Annual Average	
Plant Generation:	45 GW.h
Storage:	24 million m ³

G.M. Shrum

General Information

Project Name:	G.M. Shrum
Dam Name:	W.A.C. Bennett
Dam Height:	183 metres
Reservoir Name:	Williston
Reservoir Area:	177,000 hectares
Water Course:	Peace River
Downstream Project:	Peace Canyon Dam

Description

Gordon M. Shrum Generating Station is located on the Peace River 23 kilometres upstream from Peace Canyon Dam, and about 160 river kilometres upstream from the B.C./Alberta border. Together with W.A.C. Bennett Dam it comprises the Portage Mountain Project.

History

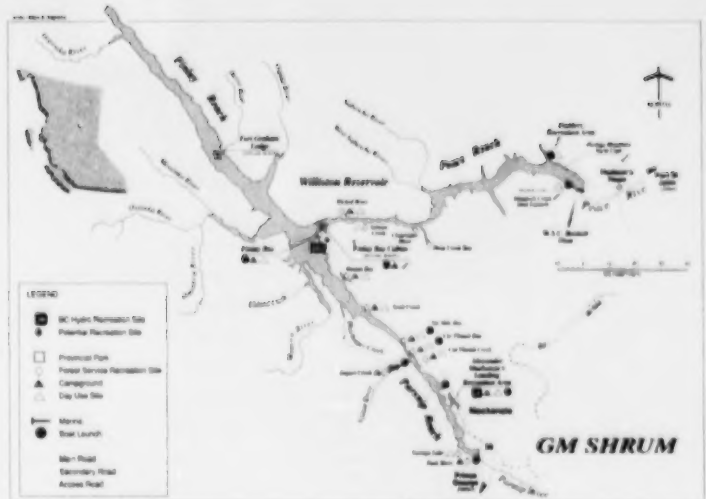
Construction commenced in November 1961 and reservoir filling began in December 1967. The first three units were in service on September 22, 1968 and all 10 units in service by February 12, 1980.

Drainage Basin

The reservoir is of an approximate T-shape with Finlay River Reach to the north, Parsnip River Reach to the south (both within the Rocky Mountain Trench), and the Peace Reach extending to the east through the Rocky Mountains to the damsite. A number of relatively minor reaches extend up other rivers. The drainage area is 69,930 km².

Inflow

The project basin has a runoff pattern typical of cold, snowy climates. Winter runoff is almost entirely from groundwater storage and is relatively constant, but small in volume. In late April and May, the accumulated winter snowpack begins to melt and runoff increases, peaking in June and subsiding by August/September, with an average runoff of 1,097m³/s.



Reservoir

Williston Reservoir, at maximum normal elevation of 672.08 metres, has a surface area of 1773 km² and a total storage volume of 74,256 million m³ of which 39,472 million m³ is live storage. Normal operating drawdown is less than 17 metres.

Operating Constraints

Williston Reservoir maximum normal elevation is 672.08 metres and minimum operating level is 640.08 metres. Log transport is affected if the elevation drops below 659.89 metres, and the local pulp mill water intake is affected below 653.80 metres.

Capability

Maximum Sustained	
Generating Capacity:	2,730 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	13,225 GW.h
Live Storage:	39,462 million m ³

Hugh Keenleyside

General Information

Project Name:	Hugh Keenleyside
Dam Name:	Hugh Keenleyside
Dam Height:	52 metres
Reservoir Name:	Arrow Lakes Reservoir
Reservoir Area:	51,600 hectares
Water Course:	Columbia River
Upstream Project:	Revelstoke, Whatshan, Walter Hardman
Downstream Project:	Grand Coulee (USA)

Description

Earthfill and concrete structure, incorporating a navigation lock, four spillways, and eight low-level ports. Located eight kilometres upstream from Castlegar on the Columbia River.

History

Built under the terms of the Columbia River Treaty. The dam became operational in 1968.

Drainage Basin

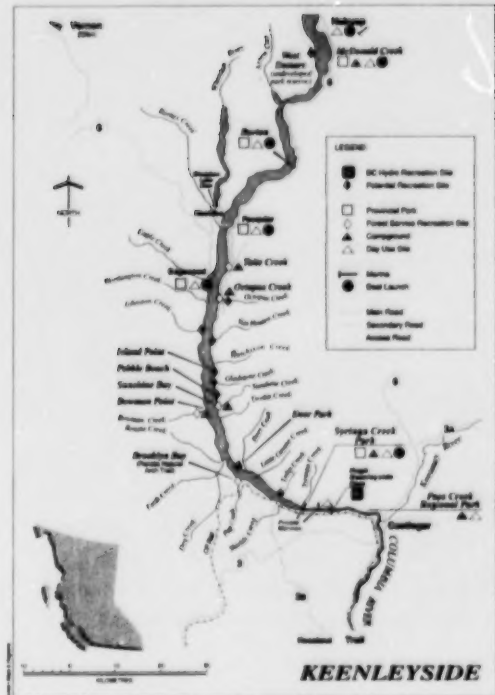
The drainage basin for the Columbia River above Hugh Keenleyside is about 36,500 km² of which 26,400 km² lies above the Revelstoke Dam. The Upper Arrow basin (near Revelstoke) is relatively wetter and cooler than the Lower Arrow basin (near Castlegar).

Inflow

Snowmelt runoff is a major source of streamflow, with runoff peaking in June. The long-term average streamflow is about 1,150 m³/s. Actual inflows are substantially regulated by the upstream Mica Project.

Reservoir

The Arrow Lakes Reservoir was formed from two natural lakes, Upper Arrow and Lower Arrow. At low levels the reservoir again separates into two sections. The Arrow Lakes Reservoir is about 230 kilometres long with a surface area, at full pool, of about 520 km².



Operating Constraints

Minimum discharge of 140 m³/s, although a higher minimum discharge is normally maintained for downstream waste dilution and log handling reasons. Maximum normal discharge is 2830 m³/s. Maximum rate of change is 430 m³/s per day.

Normal Full Pool: 440.13 metres

Minimum Pool: 420 metres

Specific releases and operating procedures are provided to preserve the habitat for Mountain Whitefish and Rainbow Trout and to reduce the level of dissolved gas.

Reservoir elevation can affect:

- fish access to tributaries
- water transportation;
- recreation opportunities

Capability

Maximum Sustained

Generating Capacity: None

Turbine type: None

Historic Annual Average

Plant Generation: None

Storage: 8,770 million m³

John Hart

General Information

Project Name: John Hart
Dam Name: John Hart
Dam Height: 34 metres
Reservoir Name: John Hart Reservoir
Reservoir Area: 250 hectares
Water Course: Campbell River
Upstream Project: Ladore

Description

Water is carried by three penstocks to the six-unit, 126 MW powerhouse located downstream from Elk Falls.

History

Initial construction began in 1945 and was completed in 1953. Major renovations of the dam, surge towers, and powerhouse commenced in 1988.

Drainage Basin

The Campbell River system on the east side of Vancouver Island encompassing a major portion of Strathcona Provincial Park.

Inflow

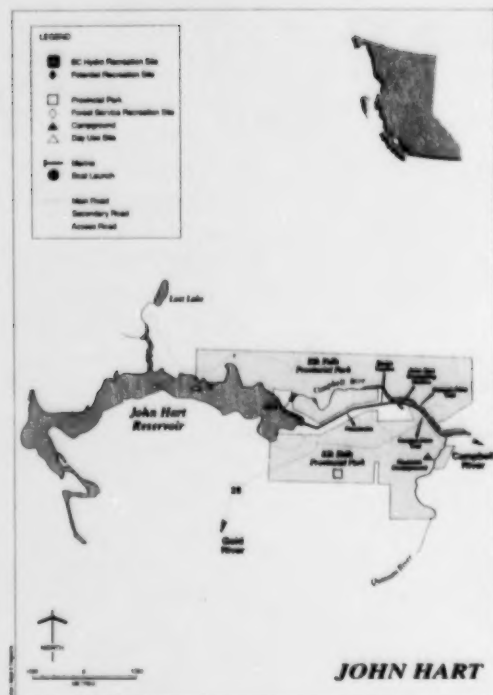
There is no significant local inflow.

Reservoir

The reservoir contains no significant storage. The regulation of flows for John Hart is done at Strathcona and Ladore dams.

Operating Constraints

Normal operating range is between El. 139 m and 139.6 metres. Drafting the forebay below El. 139 m may cause vortexes to form at the intakes. A minimum forebay elevation of 138.84 metres is required for the Pacific Reserve Technology Inc. (tree nursery) and Gordon Rd. residential subdivision to draw water.



Releases below 28.3 m³/s may create problems for Elk Falls Mill pumphouse intake. The Water Comptroller has directed that John Hart Dam spillway and powerplant be operated in accordance with sections 5.2.1 to 5.2.4 of the Recommended Operating Regime of the Campbell River Interim Flow Management Strategy dated May 1997.

Capability

Maximum Sustained

Generating Capacity:	126 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	776 GW.h
Storage:	3.3 million m ³

Jordan River

General Information

Project Name:	Jordan River
Dam Names:	Elliott, Jordan Diversion, and Bear Creek
Dam Heights:	27.4 metres (Elliott) 39.9 metres (Jordan) 19 metres (Bear Creek)
Reservoir Names:	Elliott, Diversion, and Bear Creek
Reservoir Areas:	16 hectares (Elliott) 168 hectares (Diversion) 75 hectares (Bear Creek)
Water Course:	Jordan River

Description

Storage dam on Bear Creek, a tributary of the Jordan River. Downstream from the confluence of Bear Creek and Jordan River is the main Diversion Reservoir which controls the flow into the small Elliott Reservoir. The water flows from the Elliott Dam through a 5.3-kilometre tunnel and 1.6-kilometre penstock to the 170 MW powerhouse, just upstream from the mouth of the Jordan River.

History

Original 26 MW plant first operated in 1911. Old plant was retired and replaced with a 170 MW unit in 1971.

Drainage Basin

Jordan River drainage basin on the west coast of Vancouver Island experiences high annual precipitation mostly as rain.

Inflow

Heavy rains in the fall and winter produce high peak flows. Average annual inflow is 12 m³/s.

Reservoir

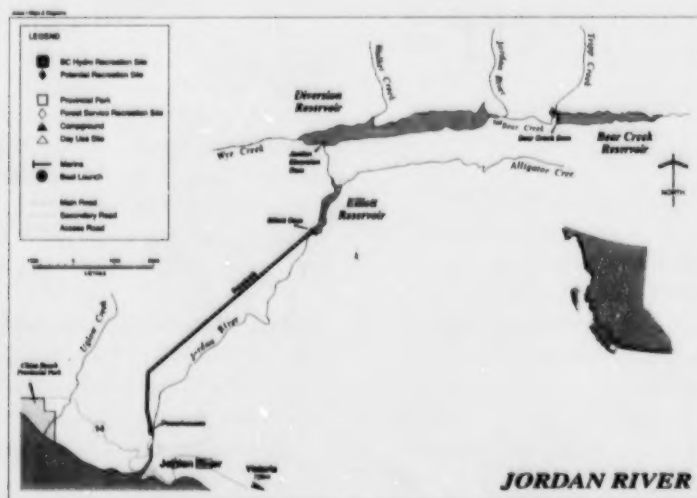
The Diversion Reservoir has little storage.

Operating Constraints

The Fish and Wildlife Branch should be notified prior to any draft of the Bear Creek and Diversion Reservoir close to their minimum operating levels. Prior to dewatering of the Jordan G1 penstock, the holding tank is to be filled to ensure adequate supply of water for the town of Jordan River during the outage.

Capability

Maximum Sustained Generating Capacity:	170 MW
Turbine type:	High Head Francis
Historic Annual Average Plant Generation:	242 GWh
Storage:	28 million m ³



Keogh

General Information

Project Name: Keogh Generating Station
Type: Simple Cycle
Combustion Turbine
Fuel: Number Two Diesel
Back Up Fuel: Same

Description

Two-unit, 44 MW powerhouse located about 24 kilometres from Port Hardy.

History

The plant was built in the mid-1970s to provide peaking support for Vancouver Island and emergency support for the local area.

Operating Constraints

Pollution Control Permit restricts the discharge of contaminants into the atmosphere and diesel contaminants on the ground.

Capability

Maximum Sustained
Generating Capacity: 44 MW
Turbine Type: Aero derivative
combustion turbine
Fuel Tank Live Storage: Approximately
2.5 million litres
diesel on site



Kootenay Canal

General Information

Project Name:	Kootenay Canal
Dam Name:	Kootenay Canal
Dam Height:	38 metres
Reservoir Name:	Kootenay Canal Headpond
Reservoir Area:	0
Water Course:	Kootenay River
Upstream Project:	Duncan and Libby (U.S.)
Downstream Project:	Brilliant

Description

Power canal and 559 MW powerhouse in parallel with West Kootenay generating stations.

History

Construction completed in 1976.

Drainage Basin

43,214 km² total consisting of 17,547 km² unregulated drainage plus 23,271 km² above Libby and 2,396 km² above Duncan.

Inflow

Natural inflow is snowmelt dominated, with increases in April and decreases by August. Average annual local inflow is 366 m³/s; streamflow is 792 m³/s.

Operating Constraints

Kootenay Lake Reservoir levels are controlled in accordance with the International Joint Commission (IJC) Order held by West Kootenay Power. A minimum flow release of 142 m³/s must be maintained in Kootenay River year round. Maintain an adequate water level in the canal to keep the Bird Creek syphon primed.



Capability

Maximum Sustained	
Generating Capacity:	570 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	3,153 GWh
Storage:	Licensed to West Kootenay Power and Cominco.

Ladore

General Information

Project Name:	Ladore
Dam Name:	Ladore
Dam Height:	37.5 metres
Reservoir Name:	Lower Campbell Lake
Reservoir Area:	3,700 hectares
Water Course:	Campbell River
Upstream Project:	Strathcona
Downstream Project:	John Hart

Description

The generating station is located adjacent to the dam. Water is carried by tunnels to the two generating units in the 47 MW powerhouse. Diversion dams on the Salmon and Quinsam rivers augment the natural inflow into Lower Campbell Lake Reservoir.

History

Ladore was constructed from 1955 to 1958 as part of the Campbell River development.

Drainage Basin

The Campbell River system on the east side of Vancouver Island.

Inflow

The Salmon River and Quinsam River are diverted into Lower Campbell Lake Reservoir. Average annual local inflow is 23 m³/s.

Reservoir

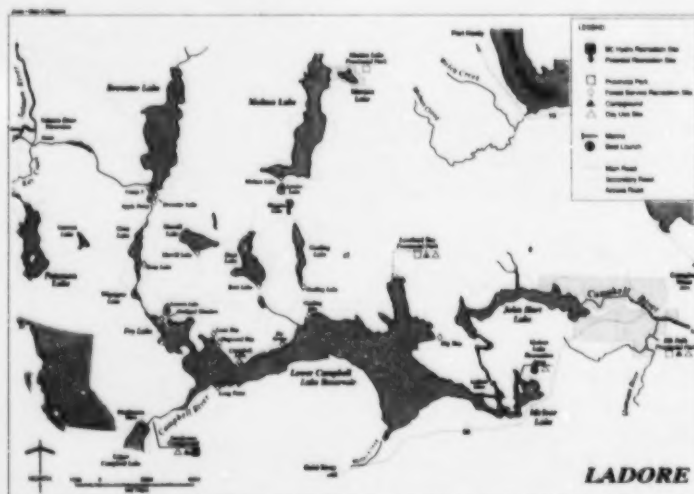
Maximum reservoir drawdown is 15.24 metres from elevation 178.3 metres to 163 metres.

Operating Constraints

Lower Campbell Lake Reservoir is operated within elevations of 176 metres to 177 metres for recreational purposes from June 1 to September 30.

Capability

Maximum Sustained	
Generating Capacity:	47 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	229 GW.h
Storage:	316 million m ³



La Joie

General Information

Project Name:	La Joie
Dam Name:	La Joie
Dam Height:	87 metres
Reservoir Name:	Downton
Reservoir Area:	2,400 hectares
Water Course:	Bridge River
Downstream Project:	Bridge River

Description

Dam and single-unit 25 MW powerhouse upstream from Carpenter Reservoir near Gold Bridge.

History

Completed in 1956.

Drainage Basin

Upper Bridge River Basin in Coast Mountains.

Inflow

Most inflow in the spring and summer from snow and glacial melt. Average annual inflow is about 40 m³/s.

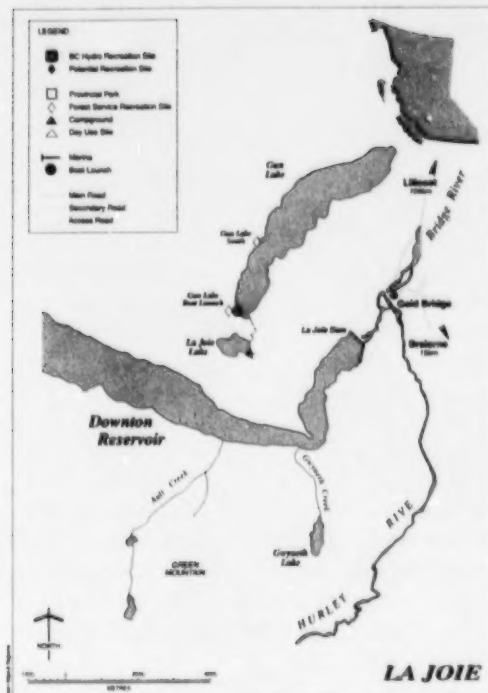
Reservoir

Downton Reservoir is a storage reservoir with a drawdown range of about 49 metres.

Operating Constraints

The normal maximum operating level is El. 749.8 metres. Downton Reservoir should not be drafted below El. 701 metres to ensure an adequate supply of cooling water to the turbine.

Levels below 710 metres may include increased sediment load or turbidity, exposing fish to poor water quality, increased predation, or stranding and increased entrainment in the intake tunnels. Discharge ramp-down rate should be 5.7 m³/s over one hour, during hours of darkness, to reduce the possibility of fish stranding.



Capability

Maximum Sustained	
Generating Capacity:	25 MW
Turbine Type:	Francis
Historic Annual Average	
Plant Generation:	162 GW.h
Storage:	722 million m ³

Mica

General Information

Project Name:	Mica
Dam Name:	Mica
Dam Height:	244 metres
Reservoir Name:	Kinbasket
Reservoir Area:	42,500 hectares
Water Course:	Columbia River
Upstream Project:	Spillimacheen
Downstream Project:	Revelstoke

Description

Earthfill dam and four-unit 1,792 MW underground powerhouse located 135 kilometres north of Revelstoke. There is provision for two additional generation units.

History

Mica Dam was built under the terms of the Columbia River Treaty. Construction began in November 1967 and it was operational March 29, 1973. The powerhouse was added in 1977.

Drainage Basin

Drainage basin above Mica Dam is on the western side of the continental divide formed by the Rocky Mountains and covers about 21,000 square kilometres. The basin is influenced primarily by the maritime air masses and by weather systems moving eastward across the basin. Substantial snowpacks develop during the

winter at all elevations in the basin. Runoff is primarily from snowmelt. About 50 per cent of the annual inflow volume is received during the months of June and July. Rainfall is a minor contributor to the annual volume but can produce high peak flows, especially during the spring and fall.

Inflow

The average inflow is 586 m³/s. and predominantly from snowmelt. Inflows typically increase rapidly in May, peak in June/July and taper off to a low of about 100 m³/s in January.

Reservoir

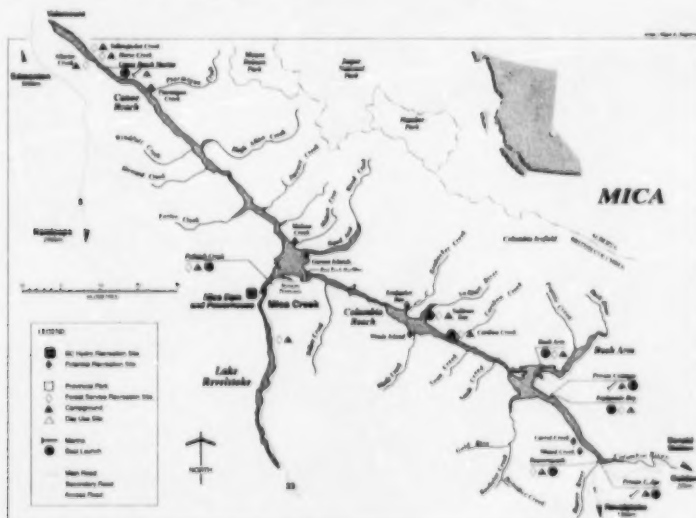
The Kinbasket Reservoir is 216 kilometres long and has a maximum live storage content of 14,800 million m³.

Operating Constraints

The maximum operating elevation is 754.4 metres and the minimum is 707 metres. The Mica project is operated under the terms of the Columbia River Treaty and Non-Treaty Storage Agreement.

Capability

Maximum Sustained	
Generating Capacity:	1,792 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	7,202 GW.h/a
Storage:	14,800 million m ³



Peace Canyon

General Information

Project Name:	Peace Canyon
Dam Name:	Peace Canyon
Dam Height:	61 metres
Reservoir Name:	Dinosaur
Reservoir Area:	890 hectares
Water Course:	Peace River
Upstream Project:	W.A.C. Bennett Dam

Description

The Peace Canyon Project is located in northeast British Columbia on the Peace River, 23 kilometres downstream from the G.M. Shrum G.S., and 128 kilometres upstream from the B.C.-Alberta border.

History

Construction commenced in July 1974. The first generating unit came into service on April 3, 1980, and all four units were in service by November 6, 1980.

Drainage Basin

Between Bennett Dam and Peace Canyon Dam, the drainage area of 465 km² produces an average runoff of 8.5 m³/s.

Inflow

There is no appreciable local inflow.

Reservoir

Dinosaur Reservoir extends from Peace Canyon Dam up to the tailrace of G.M. Shrum powerplant. It is a narrow reservoir generally confined within steep rocky slopes of the Peace River Canyon. At maximum normal reservoir elevation, 503 metres, it has a storage volume of 215.86 million m³.

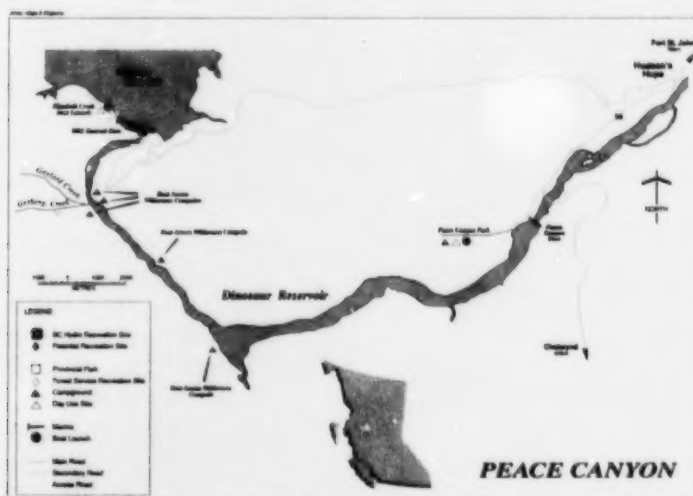
Operating Constraints

Dinosaur Reservoir can normally be operated between elevations 502.9 metres and 500 metres. Drafting to the lower portion of the range requires caution to protect the stability of Dinosaur Reservoir 3.5 Mile Slide.

Maximum turbine discharge is 1,982 m³/s and minimum project discharge is 283 m³/s. A controlled flow is maintained during the winter to help form the ice cover on the river. The ice cover is monitored regularly and the project discharge is agreed upon by BC Hydro and Alberta Environment and Protection.

Capability

Maximum Sustained	
Generating Capacity:	700 MW
Turbine type:	Medium Head Francis
Historic Annual Average	
Plant Generation:	3,111 GW.h
Storage:	24 million m ³



Prince Rupert

General Information

Project Name:	Prince Rupert
Type:	Simple Cycle Combustion Turbine
Fuel:	Natural Gas
Back Up Fuel:	Diesel

Description

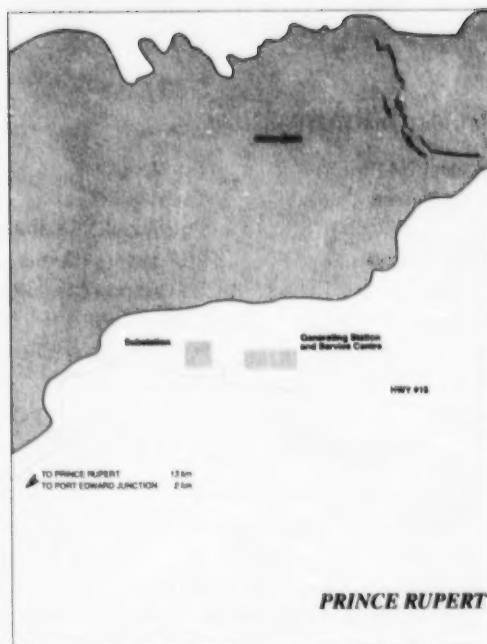
A two-unit powerhouse, with the capability to provide a total of 46 MW, located 15 kilometres from Prince Rupert. The Prince Rupert Generating Station is generally used for emergency or routine maintenance requirements.

Operating Constraints

Waste Management Permit restricts releases of contaminants into the atmosphere and effluent from the fuel tanks.

Capability

Maximum Sustained	
Generating Capacity:	46 MW
Turbine type:	Aero derivative combustion turbine
Fuel Tank Live Storage:	3.4 million litres



Puntledge

General Information

Project Name:	Puntledge
Dam Names:	Comox and Puntledge Diversion
Dam Heights:	10.7 metres (Comox) 5.5 metres (Puntledge)
Reservoir Name:	Comox Lake
Reservoir Areas:	3,000 hectares (Comox)
Water Course:	Puntledge River

Description

Project consists of storage dam (Comox Dam) at the outlet of Comox Lake Reservoir, and a diversion dam (Puntledge) four kilometres downstream. Water is carried by a penstock from the diversion dam a further five kilometres to a 24 MW powerhouse.

History

Originally developed in 1912 by Canadian Collieries (Dunsmuir) Ltd.

Drainage Basin

The Puntledge River basin lies on the eastern side of the Vancouver Island Mountain Range. The basin above Comox Dam covers an area of approximately 460 km². Comox Lake Reservoir is fed primarily by the Puntledge River and the Cruickshank River.

Inflow

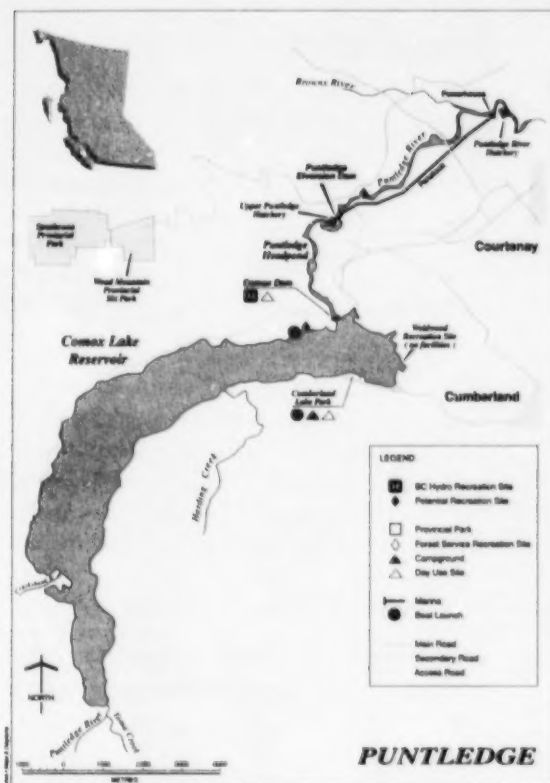
The annual streamflow pattern of the Puntledge River system upstream from Comox Dam is characterized by two high flow periods:

- during the fall and winter period coincident with heavy storm events;
- during the spring and summer snowmelt period.

Average annual inflow is 34 m³/s.

Reservoir

The Comox Lake Reservoir operates between 130.8 metres and 134.4 metres in winter, and 130.8 metres and 135.33 metres in summer.



Operating Constraints

Higher reservoir elevations may cause flooding in houses around the reservoir, and prolonged (seven to 10 days) exposures to elevations higher than 135.64 metres may result in erosion of a logging road causeway and Cumberland Park beach.

Fisheries and Oceans Canada provide a combined flow of 2.8 m³/s via the spawning channel and the fish ladder gate at the diversion dam. BC Hydro provides fish water releases to supplement the above releases for a total flow of 5.7 m³/s or higher in the Puntledge River above Browns River. BC Hydro also releases sufficient water either via the turbine and via spilling at the Diversion Dam to provide a flow of 15.6 m³/s or greater in the Puntledge River downstream of the powerhouse.

Capability

Maximum Sustained	
Generating Capacity:	24 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	156 GW.h
Storage:	106 million m ³

Revelstoke

General Information

Project Name:	Revelstoke
Dam Name:	Revelstoke
Dam Height:	175 metres
Reservoir Name:	Revelstoke
Reservoir Area:	11,530 hectares
Water Course:	Columbia River
Upstream Project:	Mica
Downstream Project:	Keenleyside

Description

Concrete gravity dam with a four-unit power-house capable of a total of 1,980 MW. There is provision for two additional generating units.

History

Completed in 1984, the powerplant takes advantage of regulation provided by Mica Dam.

Drainage Basin

26,500 km², of which 21,000 km² is above Mica Dam.

Inflow

The average local inflow is 221 m³/s and is predominantly from snowmelt. Local inflows typically increase rapidly in May, peak in June and taper off to a low of 43 m³/s in January.

Reservoir

Normally remains within about 0.5 metres of full pool as the powerplant operates in balance with Mica discharges upstream. Occasional drafts of up to three metres may occur during various times of the year.

Operating Constraints

The maximum operating elevation is 573 metres and the minimum is 557.8 metres. The maximum turbine discharge rate is 1,750 m³/s. The Revelstoke project is operated to help meet the terms of the Columbia River Treaty and Non-Treaty Storage Agreement.



Capability

Maximum Sustained	
Generating Capacity:	1,980 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	7,817 GW/h/a
Storage:	1,850 million m ³

Ruskin

General Information

Project Name:	Ruskin
Dam Name:	Ruskin
Dam Height:	59.4 metres
Reservoir Name:	Hayward Lake
Reservoir Area:	300 hectares
Water Course:	Stave River
Upstream Project:	Stave Falls

Description

Concrete dam and powerhouse on the Stave River near its confluence with the Fraser River. The 105 MW powerhouse contains three generating units.

History

The first two units went into service in 1930 with the third unit following in 1950.

Drainage Basin

Storage reservoir is Stave Lake.

Inflow

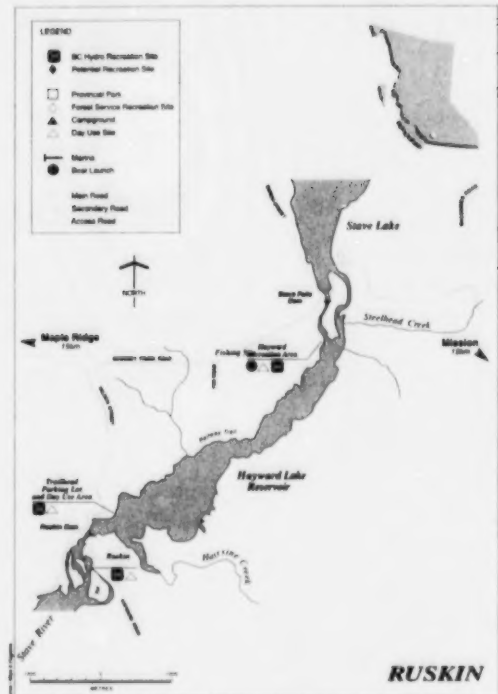
Little local inflow. Inflow into Hayward Lake Reservoir comes mainly from Stave Falls which has an average natural annual inflow of about 111 m³/s and an additional 21 m³/s from the Alouette project.

Reservoir

Water levels generally fluctuate about 0.5 metres to one metre daily, year-round. Normal daily operating range is from 41.5 metres to a maximum of 42.5 metres.

Operating Constraints

Daily discharge from Ruskin is normally balanced with daily discharge from Stave Falls. The reservoir is drawn down to 33 metres for maintenance on the spill gates once or twice per year. Spills in excess of 425 m³/s may cause flooding downstream from the plant.



Specified releases for fish downstream from the powerplant are required at certain times of the year. Stave Falls and Ruskin are jointly operated to provide specific downstream conditions for fisheries needs, prescribed by the Stave Water Use Plan.

Capability

Maximum Sustained	
Generating Capacity:	105 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	339 GW.h
Storage:	24 million m ³

Seton

General Information

Project Name:	Seton
Dam Name:	Seton
Dam Height:	14.4 metres
Reservoir Name:	Seton Lake
Reservoir Area:	2,460 hectares
Water Course:	Seton River
Upstream Project:	Bridge River
Downstream Project:	None

Description

Water is carried by a canal to a small forebay adjacent to the powerhouse. There is a short penstock to the single unit powerhouse located on the Fraser River.

History

Powerplant was completed in 1956.

Drainage Basin

Located in the Coastal Mountains.

Inflow

Seton flow is regulated by Bridge River installation. Cayoosh Creek is diverted to Seton Lake. Reservoir. Average annual local inflow is 18 m³/s.

Reservoir

Normal operating range of the reservoir is 0.4 metre.

Operating Constraints

Fish flow releases and operating constraints are in effect to accommodate upstream and downstream pink salmon migration and spawning periods, sockeye migrations, other adult salmon migrations, sockeye smolt emigration. Irrigation users and fisheries agencies must be informed when dewatering the canal and/or forebay for periods exceeding 24 hours.

Elevations below 235.73 can result in severe head-loss and consequent generation restrictions, and loss of water supply to private irrigation syphons due to low canal elevations.

Capability

Maximum Sustained	
Generating Capacity:	48 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	325 GW.h
Storage:	9 million m ³



Seven Mile

General Information

Project Name:	Seven Mile
Dam Name:	Seven Mile
Dam Height:	80 metres
Reservoir Name:	Seven Mile
Reservoir Area:	410 hectares
Water Course:	Pend d'Oreille River
Upstream Project:	Boundary Dam (U.S.)
Downstream Project:	Waneta Dam

Description

Located on the Pend d'Oreille River, the Seven-Mile project consists of a concrete gravity dam and a three-unit 594 MW powerplant. There is provision for a fourth unit.

History

The powerplant came into service in 1979.

Inflow

Inflow is regulated by upstream projects, and is generally high from the spring runoff starting April/May and tapering off in August. Average annual local inflow is 33 m³/s.

Reservoir

Run-of-river reservoir fluctuates daily.

Operating Constraints

Maximum daily reservoir fluctuation is restricted to six metres/day in winter to avoid bank erosion and four metres/day in summer for recreation.

Deep drawdown can affect fish passage to tributaries.

During the white sturgeon spawning and hatching period of June, July and August, Seven Mile is operated to minimize spills at the downstream Waneta project.

Capability

Maximum Sustained Generating Capacity:	594 MW
Turbine type:	Francis
Historic Annual Average Plant Generation:	3,102 GW.h
Storage:	Daily pondage



Spillimacheen

General Information

Project Name:	Spillimacheen
Dam Name:	Spillimacheen
Dam Height:	14.5 metres
Water Course:	Spillimacheen River
Downstream Project:	Mica

Description

Located on the Spillimacheen River, 55 kilometres upstream from Golden. A small dam diverts water through 1.5-kilometre penstocks to a 4 MW powerhouse (one 2.2 MW and two 0.9 MW generating units).

History

The powerplant was completed in 1955.

Drainage Basin

Spillimacheen drainage area of 1,430 km² in the Purcell Mountains.

Inflow

Low water levels limit output about six months of the year.

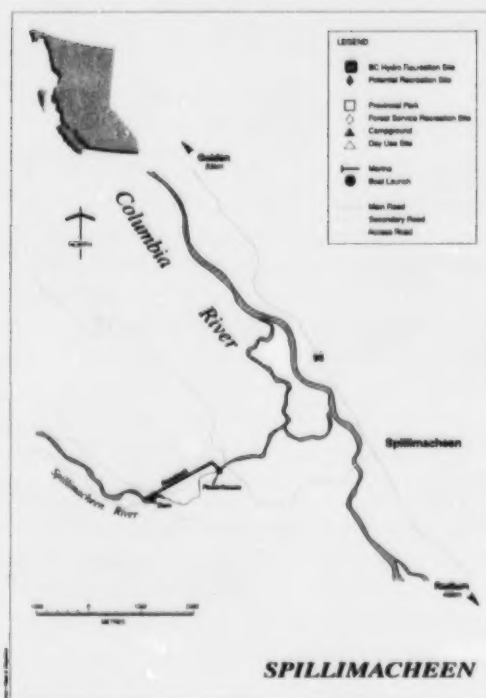
Reservoir

Run-of-river project where energy production is varied to maximize the use of river flows.

Operating Constraints

Normal headpond operating level is El. 865.56 metres. The passage of silt into the river channel after spawning activities of resident fish species is monitored and controlled.

Plant discharge is reduced gradually, when possible, to minimize rapid water level changes downstream.



Capability

Maximum Sustained	
Generating Capacity:	4 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	20 GW.h
Storage:	None

Stave Falls

General Information

Project Name:	Stave Falls
Dam Name:	Stave Falls
Dam Height:	26 metres
Reservoir Name:	Stave Lake
Reservoir Area:	6,200 hectares
Water Course:	Stave River
Upstream Project:	Alouette
Downstream Project:	Ruskin

Description

Concrete dam and 90 MW powerhouse located at the outlet of Stave Lake Reservoir.

History

First power was produced in 1911. A 90 MW powerplant was introduced in 2000 to increase efficiency, reliability and quality of service. The five 10 MW units in the old powerhouse were decommissioned in February 2000.

Drainage Basin

The drainage basin includes parts of Golden Ears and Garibaldi Provincial Parks.

Inflow

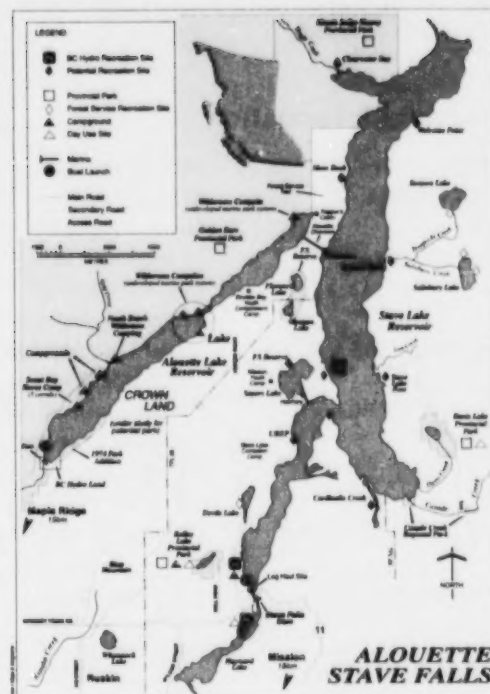
Average local inflow is about 111 m³/s with another 21 m³/s coming from Alouette. Peak inflows occur during late fall rain.

Reservoir

Normal operating range of the reservoir is 73 metres to a maximum of 82.1 metres.

Operating Constraints

Stave Falls and Ruskin are jointly operated to provide specific downstream conditions for fisheries needs, prescribed by the Stave Water Use Plan. The plant maximum turbine discharge is 283 m³/s.



Capability

Maximum Sustained	
Generating Capacity:	90 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	276 GW.h
Storage:	365 million m ³

Strathcona

General Information

Project Name:	Strathcona
Dam Names:	Strathcona and Heber Diversion
Dam Heights:	53 metres (Strathcona) 9.8 metres (Heber)
Reservoir Name:	Upper Campbell Lake and Buttle Lake
Reservoir Areas:	6,680 hectares (Upper Campbell Lake and Buttle Lake)
Water Course:	Campbell River
Downstream Projects:	Ladore and John Hart

Description

The two-unit, 64 MW powerhouse is located at the toe of the earthfill dam.

History

Constructed as part of the Campbell River development between 1955 and 1958. The #2 generating unit was installed in 1968.

Drainage Basin

Mountains of central Vancouver Island. Flows can be flashy during mild winter storms that accelerate snow melt.

Inflow

Heavy flows in the fall and during snowmelt in the spring. Heber River and Crest Creek are diverted to the Elk River which flows into Upper Campbell Lake Reservoir. Average annual inflow is 78 m³/s.

Reservoir

Upper Campbell Lake and Buttle Lake form the main storage reservoir for the three generating stations on the Campbell River System.

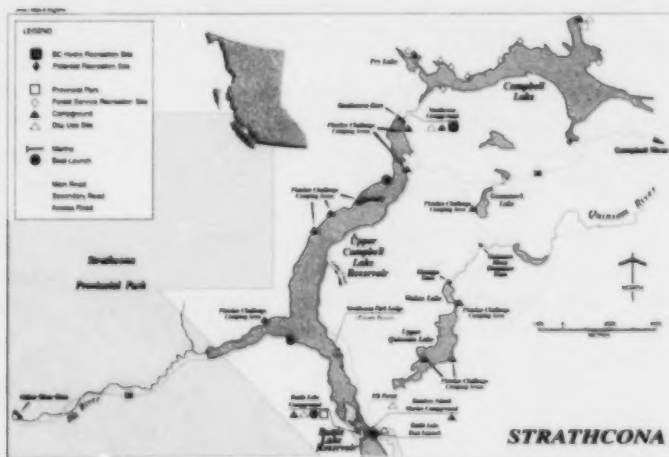
Operating Constraints

The reservoir level should be 220 metres by June 15. Drawdown is limited to 0.9 metres/month during July, August, September. At the end of this three month period the total drawdown below July 1 reservoir elevation should not exceed 2.7 metres. The reservoir is maintained above 213 metres to prevent the exposure of debris, which creates a potential safety hazard to recreational activity.

As Upper Campbell Lake Reservoir is the main storage reservoir in the Campbell River system and upstream from the John Hart Dam, Strathcona is also operated under the Water Comptroller's direction in accordance with sections 5.2.1 to 5.2.4 of the Recommended Operating Regime of the Campbell River Interim Flow Management Strategy dated May 1997.

Capability

Maximum Sustained	
Generating Capacity:	64 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	222 GW.h
Storage:	823 million m ³



Wahleach

General Information

Project Name: Wahleach
Dam Name: Wahleach
Dam Height: 21 metres
Reservoir Name: Jones Lake
Reservoir Area: 490 hectares
Water Course: Wahleach

Description

Located 30 kilometres west of Hope. Water from Jones Lake Reservoir passes through a tunnel and penstock to a powerhouse adjacent to Highway No.1 and the Fraser River.

History

The 63 MW powerplant came into service in 1952.

Drainage Basin

High alpine basin.

Inflow

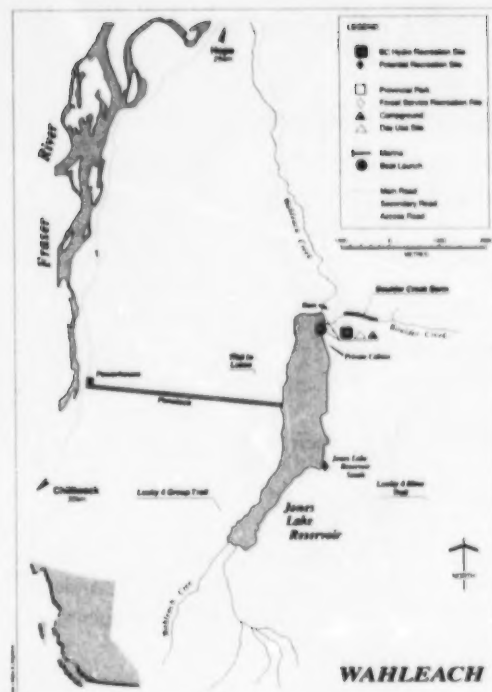
Coastal rainfall and snow. Average annual inflow is 7 m³/s.

Reservoir

Normal operating range is between 623.3 metres and a maximum of 641.6 metres.

Operating Constraints

Releases from the reservoir are made to maintain a mean flow at the spawning channel of 0.85 m³/s for fish spawning (September 15 to October 31) in Wahleach Creek. The releases are made every odd year.



Capability

Maximum Sustained	
Generating Capacity:	63 MW
Turbine type:	Vertical axis six-jet impulse
Historic Annual Average	
Plant Generation:	245 GW.h
Storage:	66 million m ³

Walter Hardman

General Information

Project Name:	Walter Hardman
Dam Names:	Coursier and Walter Hardman
Dam Heights:	19 metres (Coursier) 12 metres (Walter Hardman)
Reservoir Name:	Coursier Lake
Reservoir Area:	200 hectares
Water Course:	Cranberry Creek
Downstream Project:	Keenleyside

Description

Located 30 kilometres south of Revelstoke. A single penstock diverts water from the Cranberry Headpond to the two-unit 8 MW powerhouse on Upper Arrow Lake Reservoir.

History

Constructed in the 1960s and purchased by BC Hydro from the City of Revelstoke.

Drainage Basin

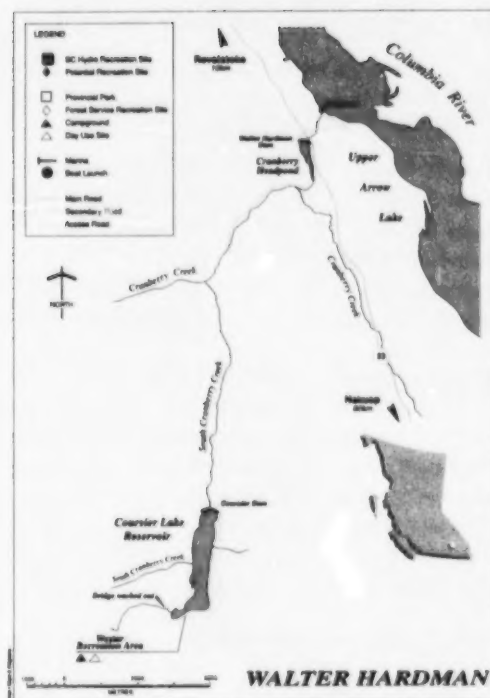
Cranberry Creek.

Reservoir

Coursier Lake Reservoir operating range is about 20 metres.

Operating Constraints

To minimize the probability of spill, the headpond is operated at a level below full pool to provide local personnel sufficient time to install stoplogs in the event of a rapid increase in inflow or if the plant trips off-line.



Capability

Maximum Sustained	
Generating Capacity:	8 MW
Turbine type:	Single-jet impulse turbine
Historic Annual Average	
Plant Generation:	46 GW.h
Storage	
(Coursier Lake Reservoir):	29 million m ³

Whatshan

General Information

Project Name:	Whatshan
Dam Name:	Whatshan
Dam Height:	12 metres
Reservoir Name:	Whatshan Lake
Reservoir Area:	1,700 hectares
Water Course:	Whatshan River
Downstream Project:	Hugh Keenleyside

Description

The Whatshan powerhouse is located on the west shore of Lower Arrow Lake Reservoir. A 3.4-kilometre, partially lined tunnel connects the power intake on Whatshan Lake Reservoir to the powerhouse. Maximum static head at the powerhouse is 215.6 metres. One 54 MW generator is located in the powerhouse.

History

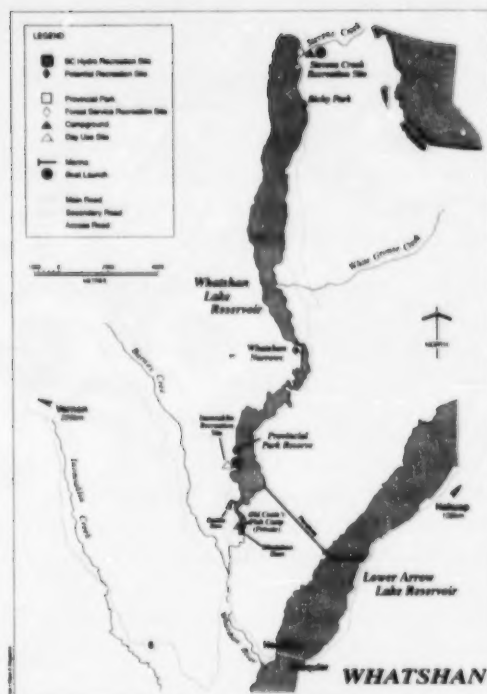
The original development was designed and constructed by the British Columbia Power Commission and came into service in 1951. In 1953 a rock and mud slide destroyed the original powerhouse and switchyard. Following slope stabilizing, the plant was rebuilt. In 1969, Arrow Lake levels were raised following completion of the Hugh Keenleyside Dam. The Whatshan generating station was rebuilt at its present location in 1972 at an elevation 12 metres higher than the previous generating station.

Drainage Basin

The Whatshan drainage basin is located in the Monashee mountains, affected by both continental and modified maritime conditions. The drainage basin has an area of about 390 km².

Inflow

The Whatshan River begins to rise in April, and usually peaks in late May or early June. Snowmelt is the major source of yearly streamflow. Approximately 60 per cent of the annual inflow occurs during May and June. An additional 20 per cent of the annual inflow is contributed in April and July. Rainfall is a minor contributor to the volume of annual inflow, but it can produce large peak flows when coinciding with extreme snowmelt conditions. Average annual inflow is 9.3 m³/s.



Reservoir

Whatshan Lake Reservoir is about 17 kilometres long and has an average width of one kilometre. The concrete dam, power intake and saddle dam are located at the south end of the lower lake.

Operating Constraints

The generator should not be operated below 15 MW as this causes excessive cavitation, nor should it be operated between 30 and 40 MW as this causes excessive vibration. Generation loading must be reduced for low elevations of Whatshan Reservoir.

Below 634.4 metres:	Synchronous condenser only
634.4 metres to 634.75 metres:	20 MW
634.75 metres to 635.0 metres:	28 MW
635.0 metres to 635.35 metres:	40 MW
Above 635.35 metres:	Full Load

Normal Full Pool:	641.30 metres
Minimum Pool:	634.00 metres

Capability

Maximum Sustained	
Generating Capacity:	54 MW
Turbine type:	Francis
Historic Annual Average	
Plant Generation:	121 GW.h
Storage:	122 million m ³

GLOSSARY

Ancillary Services: ancillary services are those services that are required to support transmission of capacity and energy from resources to loads and to maintain reliability.

Available Transfer Capability (ATC): a measure of the transfer capability remaining in the physical transmission network for further commercial activity, over and above already committed uses.

British Columbia Utilities Commission (BCUC): an independent regulatory agency of the provincial government operating under and administering the Utilities Commission Act. Primary responsibility is the regulation of the energy utilities under its jurisdiction to ensure that the rates charged customers for energy are fair, just and reasonable. Required to ensure that utility operations provide safe, adequate and secure service to their customers. Approves the construction of new facilities planned by utilities and their issuance of securities.

Capacity: the maximum sustainable amount of power that can be produced or carried at any instant.

Columbia River Treaty: a treaty signed in 1961 under which three dams were built in British Columbia for flood control and power production.

Combined Cycle Gas Turbine: an efficient method of generating electricity whereby the energy produced by combustion is utilized twice.

Dam: a barrier across a river designed to control water flow and/or form a reservoir.

Distribution: a low voltage transmission network, usually below 60 kV, for delivering electricity to customers' premises.

Downstream Benefits: according to the Columbia River Treaty, the additional power generated in the United States as a result of the operation of three storage dams (Mica, Keenleyside, Duncan) built in British Columbia. B.C. is entitled to one-half of the Downstream Benefits.

Draft: the release of stored water from a reservoir.

Drawdown/Drafting: the distance that the water surface of a reservoir is lowered as water is released from the reservoir.

Electricity Demand: the amount of electricity required by consumers or by the system.

Energy Capability: the amount of energy the electric system can produce over a given time.

Firm Energy: the assured energy contribution of the electric system over one year.

Firm Gas: the assured supply of natural gas as fuel for thermal generating stations.

Firm Transmission Service: transmission service that is reserved and/or scheduled with a priority that will not be interrupted for economic reasons.

Flow Release: the release of water through a hydroelectric facility at a prescribed flow rate.

Freshet: the rise in streamflow caused by rain or snowmelt.

Full Pool: maximum reservoir operating level permitted in the water licence.

Generator: a machine that converts mechanical energy into electric energy.

Gigawatt-hour (GW.h): one million kilowatt-hours.

Gigawatt-hours per annum (GW.h/a): the number of gigawatt-hours produced by the electric system in one year. One GW.h will serve about 100 residential customers for one year.

Grid: network of transmission lines.

Head (Hydraulic Head): the vertical distance between the water level in a reservoir above a generating station and the water level immediately below the turbine outlet. Power output is proportional to head.

Headpond: small reservoir

Hydroelectric: the production of electricity through the use of the power of falling water or streamflow.

Independent Power Producers (IPP): an entity which produces electricity for market to utilities or other customers, and is not governed by utility regulations.

Inflow: water that flows into a reservoir.

Kilovolt (kV): one thousand volts.

Kilowatt (kW): one thousand watts; the commercial unit of electric power. A kilowatt is the flow of electricity required to light ten 100 watt light bulbs.

Live Storage: storage that can be released from the reservoir

Load Centre: the region where the majority of electricity customers are located.

Load Forecasting: the determination of an estimate of average and maximum load requirements for some future time.

Long Term Transmission Service: transmission service that is reserved and/or scheduled for one year or longer.

Megawatt (MW): one thousand kilowatts. This term is commonly used to measure the capacity of generating stations; also the rate at which energy can be delivered.

Network Integration Transmission Service: a transmission service that allows the transmission customer to integrate, plan, economically dispatch, and regulate its network resources to serve its network load, both of which are distributed within a service area.

Non-firm Transmission Service: point-to-point transmission service that is scheduled and paid for on an as available basis and is subject to interruption.

Non-power: those features of electric system operations that are not related to the production of electricity.

Peak Capacity: the maximum amount of electrical power that generating stations can produce in any instant.

Penstock: the tube through which water flows from the reservoir to the turbines in a hydroelectric generating system.

Point-to-point Transmission Service: The reservation and/or transmission of energy on either a firm basis and/or a non-firm basis from point(s) of receipt to point(s) of delivery.

Power: the rate of delivery of energy measured in watts.

Powerhouse: the building or structure containing generators and ancillary equipment.

Real time pricing: market-based electricity prices for consumption beyond a customer's base load.

Reservoir: the lake or body of stored water formed by a dam.

River Basin: the geographic area drained by a river.

Run-of-River: a hydroelectric facility that operates using only available streamflow.

Short-Term Transmission Service: transmission service under WTS that is reserved and/or scheduled for a term of less than one year.

Spill: water released over a spillway without passing through turbines to produce electricity.

Storage: the water held in a reservoir for power generation or flood control.

Streamflow: the rate at which flowing water passes a given point, measured in cubic feet per second (cfs) or cubic metres per second (m³/s).

Substation: an electrical switching station to terminate transmission lines and/or a station at which transmission voltage is reduced to a level suitable for subtransmission or distribution systems.

Synchronous condenser: a motor or generator operated at synchronous speed to provide voltage support.

System Control Centre: the central location for supervisory control of the generation and transmission systems.

Tailrace: the channel through which water exits a powerhouse.

Thermal Generation: the generation of electricity by means of the conversion of heat energy into electric energy; generation through the burning of fossil fuels or biomass.

Time-shift: the use of reservoir storage and peaking capability of BC Hydro's hydroelectric system to store water when available and generate electricity when needed.

Total Transfer Capability (TTC): the amount of electric power that can be transferred over the interconnected transmission network in a reliable manner while meeting all of a specified set of defined pre- and post-contingency system conditions.

Transmission: the transportation or conveyance of electricity in bulk at voltages over 60 kV.

Turbine: a rotary device caused to turn by the movement of gases, steam or water.

Unbundling: the separation of various services associated with power delivery.

Water Licences: the authority granted to BC Hydro by the Comptroller of Water Rights of the Province of British Columbia to store and divert water for the generation of electricity and other purposes.

Wholesale Transmission Services (WTS): enables other energy providers to purchase transmission services on BC Hydro's system to transmit wholesale energy.

WSCC: Western Systems Coordinating Council—the body that sets electric system operating performance and reliability standards for members in western Canada and U. S.